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Forest Service

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April 1991

Bohemia Mountain Timber Sale

Draft Environmental Impact Statement

Stikine Area

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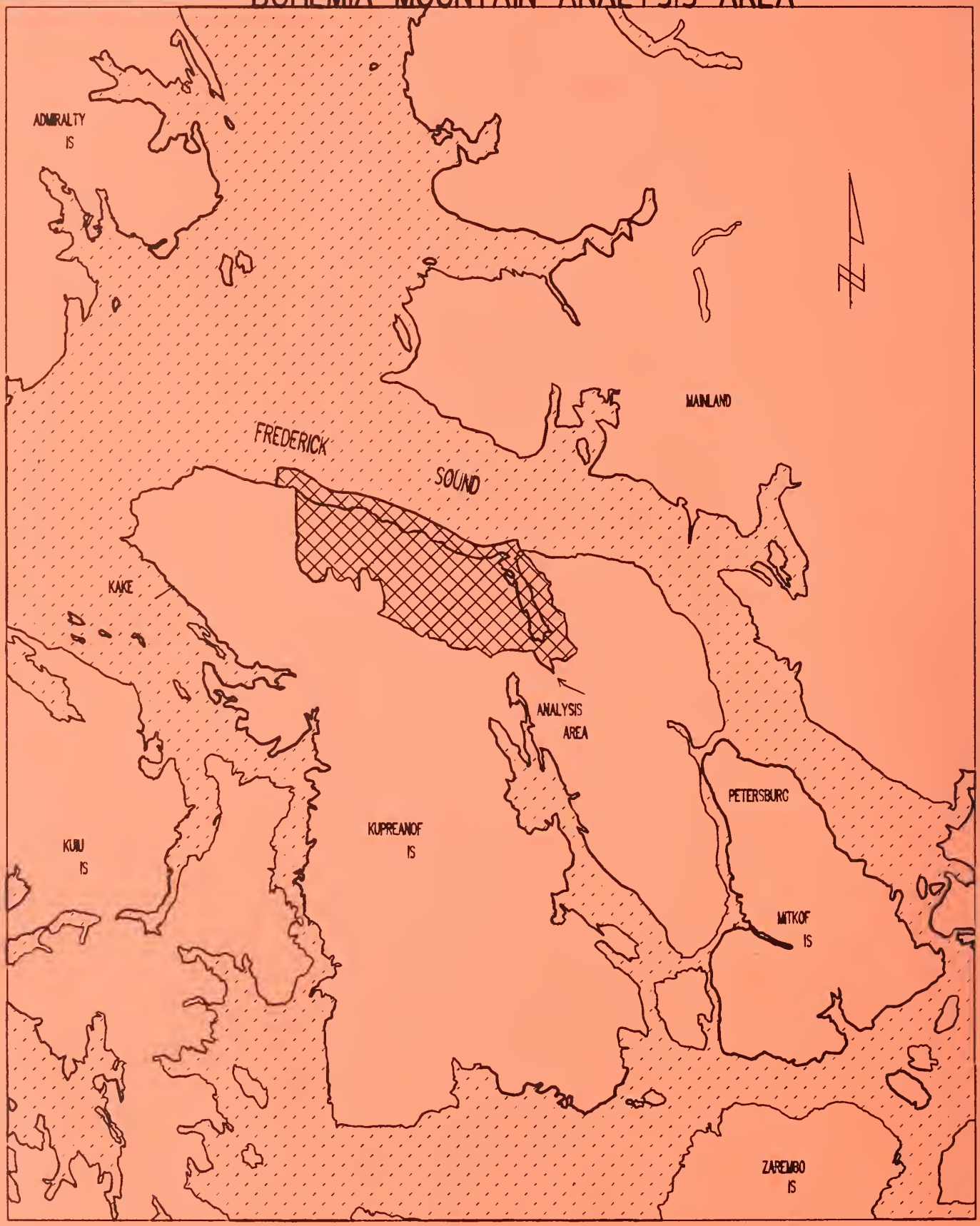
VICINITY MAP OF
BOHEMIA MOUNTAIN ANALYSIS AREA



Draft Environmental Impact Statement

Bohemia Mountain Timber Sale

U.S.D.A. - Forest Service
Tongass National Forest
Stikine Area
April 1991

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Comments Must Be Received:	*Within 45 days of the date of publication of the Draft EIS in the Federal Register. Mail all comments to Tamara S. Malone, IDT Leader, P.O. Box 309, Petersburg, AK 99833.*

Summary

Summary

Introduction

This document is the result of an analysis of whether to implement or defer a timber sale on north Kupreanof Island under the direction of the current Forest Plan. The project proposed in this document is one or more short-term timber sales designed for independent timber sale operators. Independent short-term timber sales are allowed by the Forest Plan in order to maintain a supply of timber for the independent logging community in southeast Alaska. This analysis will also determine whether or not to recommend all or portions of 12 miles of Duncan-Salt Chuck Creek for inclusion in the National Wild and Scenic River system. The analysis area is identified in the Forest Plan as land use designation (LUD) II, "which emphasizes management in a roadless state while allowing for wildlife and fish habitat improvement projects, roads that are vital transportation links, and timber harvesting to control insect infestations", and LUD IV, "for intensive resource use and development where emphasis is primarily on commodity or market resources."

Five action alternatives and a no action alternative were considered in this Draft EIS. New Perspectives concepts are incorporated as part of this analysis. This project plan is a prototype for the Tongass National Forest to determine the suitabilty of a river for possible inclusion in the National Wild and Scenic River system outside the Forest Plan Revision process.

Issues

The alternatives were developed to address eight issues defined through public involvement and management concerns. The eight issues are:

1. Sufficient wildlife habitat
2. Water quality and downstream anadromous fish habitat
3. Subsistence resources and users
4. Economically viable timber sale
5. Kake/Portage road connection
6. Potential impacts on Wilderness and associated values
7. Maintenance of scenic quality
8. Wild and Scenic River designation

Alternatives Considered

Alternative 1

The "No Action" alternative would defer harvest of timber, construct no new roads, and would not recommend Duncan-Salt Chuck Creek for designation in the National Wild and Scenic River system.

North and South Routes

Two alternatives exist as to the location of a segment of Collector Road 6030 that parallels the gorge of Duncan Salt Chuck Creek. No decision has been made as to the final location. There are environmental and economic trade-off desisions that will be made after further field review prior to the final EIS.

The south route is located near the top of a ridge that parallels the creek. All ditches draining from this route will drain away from Duncan Salt Chuck Creek. This route would require the permanent installation of two bridges, one that crosses the creek running from an unnamed lake into Duncan Salt Chuck Creek and one that crosses Duncan Salt Chuck Creek itself. Two additional bridges would be required to access proposed units on the west side of Bohemia Mountain. One that would cross Duncan Salt Chuck Creek and one that would cross a V-notch drainage adjacent to Duncan Salt Chuck Creek.

The north route will cross a minimum of 5 deep V-notches as well as Duncan Salt Chuck Creek. Permanent bridges would be required. Past and recent reconnaissance indicates the presence of numerous pockets of the infamous "blue clay" and very unstable conditions (slumping banks) in these V-notches. Stable reaches (those that would allow stream crossings that would minimize risk of failure) of these V-notch drainages may be found during intensive field reconnaissance planned during the 1991 field season. All V-notches terminate into Duncan Salt Chuck Creek.

Alternative 2

The "Biodiversity Alternative" would have moderate harvest while maintaining old growth blocks, meeting wilderness concerns, and minimizing stand fragmentation. Approximately 28.4 million board feet of timber on 974 acres would be harvested. An estimated 9.9 miles (north route) or 14.1 miles (south route) of specified road[1] would be constructed.

Alternative 3

The "Economics/Non-Fragmentation Alternative" was developed to maintain the eligible status of Duncan-Salt Chuck Creek and maintain wildlife habitat since units are concentrated in Portage Bay and fragmentation is minimized. It is the only alternative that immediately returns money to the Treasury. Approximately 10.9 million board feet of timber on 384 acres would be harvested. An estimated 0.5 mile of specified road[1] would be constructed.

Alternative 4

The "Commodity/Visuals Alternative" is designed to provide more amenity protection and maintain options for future management. No new harvest units would occur in Portage Bay, thus allowing existing units to "green up." Approximately 23.2 million board feet of timber on 1040 acres would be harvested. An estimated 18.3 miles (north route) or 21.5 miles (south route) of specified road[1] would be constructed.

Alternative 5

The "Commodity/Maximum Infrastructure Alternative" was designed to harvest the most volume and build the Kake/Portage road connection. Approximately 39.6 million board feet of timber on 1635 acres would be harvested. An estimated 28.1 miles (north route) or 31.4 miles (south route) of specified road[1] would be constructed.

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[1] The location and construction standards of these roads are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

Alternative 5A

The "Commodity/No Kake-Portage Connection Alternative" was designed the same as Alternative 5, but it does not build the road connection and harvests 4.7 million board feet less volume. Approximately 34.8 million board feet of timber on 1456 acres would be harvested. An estimated 19 miles (north route) or 22.2 miles (south route) of specified road[1] would be constructed.

Helicopter Logging

In order to provide the opportunity to harvest small units with helicopter yarding, helicopter logging is planned for each action alternative except Alternative 4. Helicopter units described as both clearcut and group selection are the same in all of the action alternatives.

Consequences

Each alternative provides a different mix of resource outputs that emphasize different resource values.

Wildlife Habitat

All action alternatives would harvest between 9 and 41 acres of the 9,131 acres identified as high value wildlife habitat. All alternatives defer timber harvesting within a 500-foot strip of beach fringe and within a 1,000-foot buffer around estuaries.

Water Quality and Fish Habitat

The alternatives are compared for their relative contribution of risk to fisheries based on several measuring factors. These include a combination of total length of roads, total number of stream crossings, total length of buffered and unbuffered, class III stream channel, and total acres of harvest within fish stream watersheds. All of the alternatives would present some risk. Alternative 5 would pose the greatest potential impact to fisheries in terms of the number of Class I and II watersheds entered and total existing and proposed road miles, stream crossings, and acres harvested. Alternative 3 would pose the least potential impact to fisheries in terms of the number of Class I and II watersheds entered and total existing and proposed road miles, stream crossings, acres harvested, and unbuffered, class III streams.

Subsistence Resources and Users

Increased roaded access ranging from 0.5 to 31.4 miles of permanent specified road may improve access for subsistence use, while also possibly increasing competition for subsistence resources.

Timber

Only one of the action alternatives is identified to be profitable, yielding at the mid-market test $60 per thousand board feet (MBF). The other action alternatives are not profitable for the first entry due to road building costs. The loss ranges from -$29/MBF for Alternative 2, to -$111/MBF for Alternative 4. This value may change when the sale is appraised.

Kake/Portage Road Connection

Alternative 5 is the only alternative that would build the road connection and allow timber from Bohemia Mountain to be hauled to Portage Bay Log Transfer Facility (LTF). All other action alternatives would use both LTF's and maintain two existing separate road systems.

Wilderness

Alternative 5 is the only alternative that would have an impact on the the wilderness recreation opportunity spectrum (ROS) setting. About 160 acres of the Petersburg Creek-Duncan Salt Chuck Creek Wilderness would be affected by activities related to the timber sale.

Visual Resources

All of the action alternatives would have visual impacts on viewers travelling in Portage Bay and along the Frederick Sound shoreline. Generally, the short term impacts of the helicopter-logged clearcuts would be less than those associated with the cable-yarded units, because fewer roads would be necessary and more vegetation would be left standing after harvest.

Wild and Scenic River Designation

All action alternatives, except Alternative 3, would propose designating Segment 1 (3.9 miles within the Wilderness) as a Wild River. Alternative 3 would defer analysis of the river to the Forest Plan Revision process which will be completed after this Final Environmental Impact Statement (EIS). Alternatives 2, 5, and 5A would propose Segment 2 (from the Wilderness boundary upstream to Bohemia Lake) as a Scenic River. Alternative 1 would propose no designation for the entire creek; Alternative 4 would propose no designation for Segment 2.

Mitigation of Consequences

If an action alternative is selected, the following steps are required:

(a) Minimum 330-foot buffers would be maintained around eagle nest trees.

(b) More than 8 times the minimum acres specified in the Tongass Land Management Plan will be maintained as high value wildlife habitat.

(c) All known or discovered cultural sites would be protected. If additional sites are discovered once the sale is in operation, protective measures will be taken under the timber sale contract provisions.

(d) Full bench construction and end hauling of excess excavated material would be required on designated areas for soil stability.

(e) Pursuant to the Tongass Timber Reform Act, commercial timber harvesting within a buffer zone no less than one hundred feet in width on each side of all Class I streams and those Class II streams which flow directly into a Class I stream would be prohibited. In addition, stream protection would include provision of buffer areas and other protective actions consistent with aquatic habitat management unit (AHMU) guidelines pertaining to (1) unstable banks, (2) temperature sensitivity, (3) sedimentation, and (4) large, woody debris for rearing habitat, nutrient retention, and streambed stabilization.

(f) Where deemed necessary, non-buffered, class III channels would receive protection, such as removal of all introduced slash to prevent debris loading and subsequent washout (see Best Management Practices Handbook-2509.22).

(g) The visual resource would be protected to the extent required to meet the visual quality objectives for the Bohemia Mountain analysis area as stated in the current Forest Plan. Boundaries on units will be adjusted to reduce the impact on the views from Frederick Sound and Portage Bay. Landscape design principles will be used to locate and design rock pits, sort yards, camps, and other related facilities.

(h) Rock pit and roadside rehabilitation would be performed as needed. This would include such activities as planting tree seedlings and spraying rock weathering agents to allow a better blending with the natural surroundings.

Alternative Preferred by the Forest Service

After reviewing all resource impacts, consequences, and opportunities, Alternative 5A was identified as the preferred alternative. Mitigation measures as described on page 2-27 would be applied.

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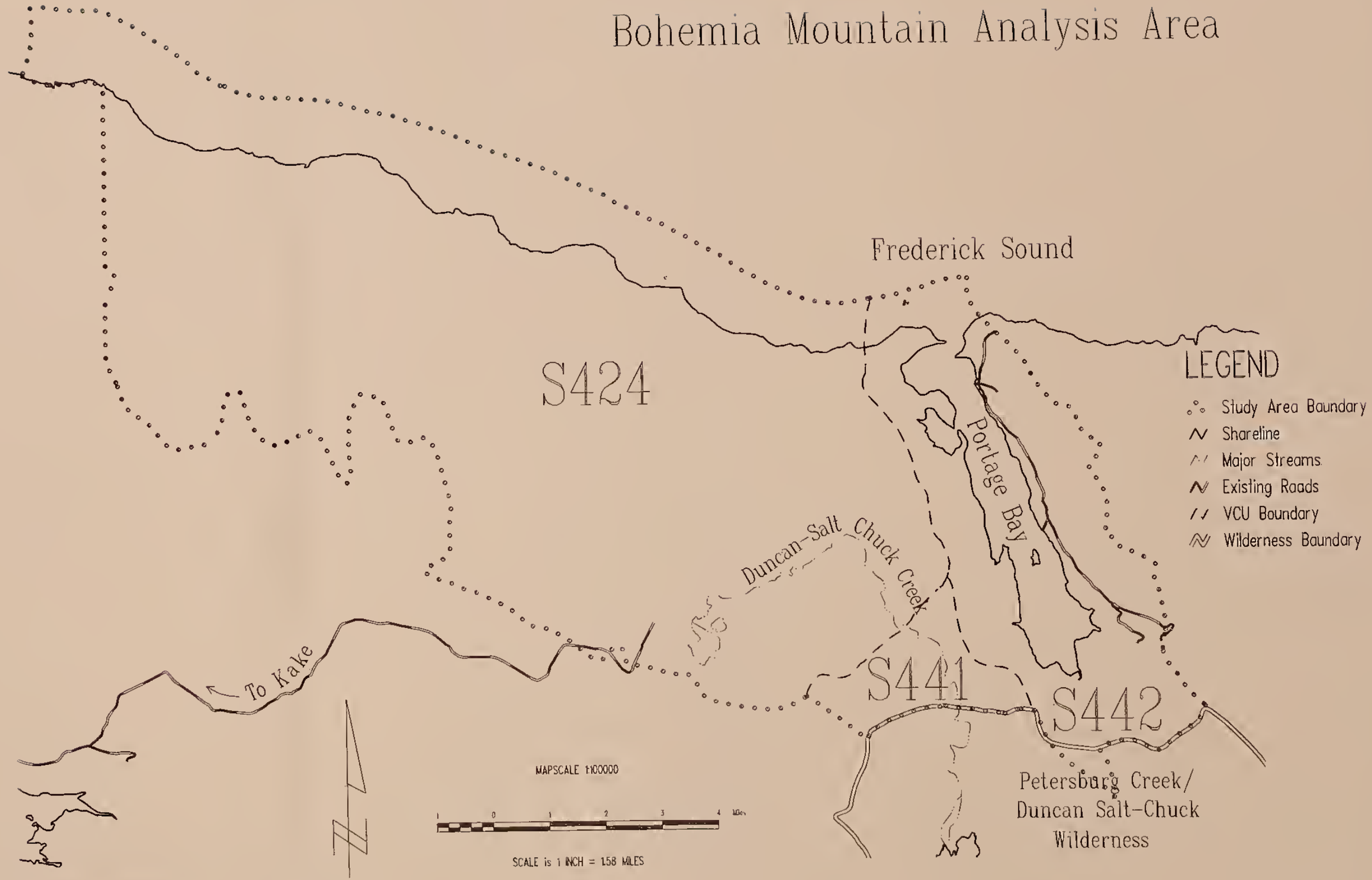


Introduction

Introduction

Purpose and Need of the Project

The purpose of this project is to locate and design a timber sale for an independent purchaser in the Bohemia Mountain area on north Kupreanof Island and also to determine the suitability of Duncan Salt Chuck Creek for possible inclusion in the Wild and Scenic River System. The need is to supply timber volume from the Tongass National Forest to independent industry, and, at the same time, to protect the appropriate natural resources for the enjoyment of future generations. This Draft Environmental Impact Statement (EIS) is tiered to the Tongass Land Management Plan (TLMP), amended in the winter 1985-1986. The analysis area is located on the Petersburg Ranger District of the Stikine Area, Tongass National Forest. The analysis area is located in all or portions of Management Areas S10 and S14; containing value comparison units (VCUs) S424, S441, and S442; has been allocated in the current Forest Plan to Land Use Designations (LUD's) II and IV, and contains approximately 67,689 acres. The Bohemia Mountain analysis area (see Map 1-1) was selected and scheduled in the current Forest Plan for a timber sale for several reasons.

1. The area is allocated primarily to LUD IV in the Forest Plan which emphasizes commodity uses allowing timber harvest. A small portion of the area is allocated to LUD II, which emphasizes management in a roadless state. The following activities would be allowed in LUD II: wildlife and fish habitat improvement projects, roads that are vital transportation links, and timber harvesting to control insect infestations.

2. Current inventories indicate there is sufficient timber volume in the area which can be harvested at this time to help meet industry needs in the independent timber sale program.

3. A considerable investment has been made in collecting data for previous projects; this data is available for the area.

4. There may be an opportunity to complete construction of Forest Road 6030 between Kake and Portage Bay to benefit other resources and administrative uses.

5. Existing log transfer facilities (LTF's) and existing logging camps will likely be used. However, due to the distance from Kake, a logging camp will be considered for the Bohemia side of the analysis area. Additionally, a floating logging camp may be provided in Portage Bay.

6. Other roaded portions of Kupreanof Island are being studied for sales or have ongoing sales and are not available for a 1992 or 1993 sale offering.

7. The sale should be responsive to Congressional direction in the Tongass Timber Reform Act and other legislation to meet market demands for timber products. The timber demand is currently high in southeast Alaska and provides opportunities to make timber available in this area to help meet market demands.

8. The area can likely be developed without having significant effects on other roadless portions of Kupreanof Island.

Purpose of the Environmental Impact Statement

The purpose of this document is to describe alternative approaches, developed from public scoping, to harvesting timber in the Bohemia Mountain area. It describes the environment that would be affected by the project, discloses the significant environmental consequences of each alternative, and responds to the issues identified in the public scoping process, including management concerns.

Varying segments of Duncan Salt Chuck Creek were studied, and included in this analysis is a range of alternative classifications for these segments, including the choice of no classification (see Appendix E). The various effects of designating versus not designating the river are disclosed, along with the short and long-term environmental consequences.

Decisions to be Made

The environmental impacts documented in this Draft Environmental Impact Statement provide the basis for the following decisions to be made by the Stikine Area Forest Supervisor and documented in the Record of Decision (ROD):

a. Will any part of Duncan Salt Chuck Creek be recommended for inclusion into the Wild and Scenic River System?

b. If any part of Duncan Salt Chuck Creek is recommended for inclusion in the Wild and Scenic River System, which classification, or combination of classifications, will be recommended--Wild, Scenic, or Recreation?

c. Will a timber sale and associated roadwork be offered in the planning area at this time?

d. If timber harvest and road construction do take place, how much in the given 10 to 45 million board feet (MMBF) range will actually occur, where will the harvest units and roads be located, which log transfer facility(s) will be used, and where will the camp and sort yard be located?

e. If the timber harvest and road construction are to occur, what special measures, in addition to the normal standards and guidelines, might be needed to protect fish, wildlife, recreation, and visual resource values?

f. Will a road connection be made between Kake and Portage Bay at this time?

Background

Resource inventories were completed in 1980 for much of the Bohemia Mountain area, the current analysis area, and the project was dropped from further study at that time due to poor market conditions and the lack of demand for timber sales in 1980. Then, in 1982, an Environmental Assessment for the Bohemia study area was completed, which designed a sale to harvest 24.1 MMBF in 18 clearcut units and construct 28.9 miles of road. This sale never sold, due to poor market conditions at the time, but the mainline road was constructed, FR 6030. The road was built ahead of the sale to improve the economics for the independent purchaser. Three units from this sale are now part of the Combination Sale currently being harvested.

The Forest Plan amendment of 1985-1986 updated Management Activity Schedules showing the Bohemia Mountain Timber Sale. The timber market in southeast Alaska began to improve, and the Bohemia Mountain sale was listed as a possible project to be offered for sale in 1992. Since the proposal includes unroaded areas, the Forest Service determined that an Environmental Impact Statement would be prepared.

The Tongass Land Management Plan is currently being revised. The Revision Draft EIS evaluated rivers on the Tongass National Forest and found 112 rivers tentatively eligible for further consideration as potential additions to the National Wild and Scenic River System. Duncan Salt Chuck Creek was determined to be eligible. Determination of whether Duncan Salt Chuck Creek should be recommended for inclusion in the Wild and Scenic River System would normally occur in the Forest Plan Revision. However, since the status of the stream could affect the location and design of the sale, and since the Revision may not be completed until 1992, the decision on whether to recommend the river will be made in conjunction with the timber sale analysis. Duncan Salt Chuck Creek was not recommended in the Regional Forester's preferred alternative in the Forest Plan Revision Draft EIS.

This EIS includes a study of the suitability of Duncan Salt Chuck Creek for inclusion in the Wild and Scenic River System.

Additional Guidance

This Draft Environmental Impact Statement (Draft EIS) is based on a systematic interdisciplinary analysis conducted with consultation with the State and other Federal agencies, the Organized Village of Kake (OVK), and other interested parties.

The Draft EIS is tiered to the current Forest Plan and the Forest Service's Alaska Regional Guide (November 1983). Tiering means that the Draft EIS will follow guidance provided in the current Forest Plan and Regional Guide; relevant portions of these documents, and others, have been incorporated into the Draft EIS by reference.

Broad direction for Forest Service planning and management is provided by many laws including, but not limited to, the National Forest Organic Act of 1901, Multiple-Use Sustained-Yield Act 1960, Resource Planning Act (RPA) of 1974, and the National Forest Management Act (NFMA) of 1976, which amended RPA.

The Organic Act and Multiple-Use Sustained Yield Act provide direction on resource management. NFMA provides direction for planning management of National Forest lands and resources. RPA requires periodic review and setting of National and Regional targets and outputs for both short-term and long-term planning. RPA is reviewed every five years and formally updated every 10-15 years. Within the framework of NFMA and RPA, management direction is provided for a Forest Service Region by a Regional Guide. A Regional Guide for Alaska was finalized in November 1983.

1 Purpose and Need

The Tongass Land Management Plan (TLMP), approved in 1979, designated various parts of the Forest for different mixes of resource use. The Forest was divided into approximately 850 value comparison units (VCU's), each consisting of a major watershed or group of minor watersheds. The degree of development and related resource protection intended was indicated by assigning a land use designation (LUD) to each of the VCU's. Designations range from LUD I, wilderness management, to LUD IV, emphasizing maximum resource development with appropriate environmental constraints.

Analysis Process

Forest Service specialists described the proposed project to the public, State, and other Federal agencies beginning with public notice in April 1989. Additional scoping letters, a newspaper article, and personal contacts were made to identify public issues associated with the proposed project. These issues are used to develop the alternatives and track whether or not the issues are being addressed throughout the analysis.

The available resource data for the Bohemia Mountain analysis area was entered into a geographic information system (GIS) to display the spatial arrangement of resource information and associated attributes (computer mapping). Resource data entered into the GIS included sensitive stream buffers, various types of wildlife habitat, sensitive visual resources, timber and soil inventories, and roads. This data was used to develop a harvest system map where the harvest settings suitable to the timber and terrain were identified. This data was then used to analyze the consequences or effects of each alternative and help identify the alternative preferred by the Forest Service. For each of the units in the proposed timber sale, mitigation measures have been identified. Mitigation measures are specific measures required for each unit. They are based on each specialist's review of photos showing proposed unit locations and on their knowledge of the area. Some minor changes in unit location are unavoidable due to undetectable ground conditions that will affect road, setting, and boundary location. Field layout of each unit would involve consultation with the specialist when special mitigation measures were required. All specialists would review each unit before finalizing sale layout to assure no significant change in impacts has occurred during field layout. We would also identify opportunities for resource enhancement and the public's use and enjoyment of the area. Inventories, reports, and other pertinent documents are part of the Bohemia Mountain planning record and are available for public inspection at the Stikine Area Supervisor's Office in Petersburg, Alaska.

Issues

The first public notice of the project appeared in April 1989. Four State agencies (Alaska Department of Fish and Game, Alaska Department of Governmental Coordination, Alaska Department of Natural Resources, and Alaska Department of Environmental Conservation), nineteen local, municipal, and state organizations, three Federal agencies (National Marine Fisheries Service, U.S. Fish and Wildlife, and U.S. EPA- Alaska Operations Office), and at least seven individuals were contacted by the interdisciplinary team (IDT) during the scoping process. A Notice of Intent to Prepare an EIS was published in the Federal Register on January 22, 1990. Responses were received from three organizations (Narrows Conservation Coalition, Heritage North, and the City of Kupreanof) and seven individuals. A Revised Notice of Intent was signed by the Forest Supervisor on January 18, 1991, when it was decided to include the study of Duncan Salt Chuck Creek in this project.

The public comments from the initial 1989 scoping of this project were reviewed and an updated scoping document was developed and mailed to interested parties on March 7, 1990. The IDT then designed alternatives to address the following issues to varying degrees:

1. **Potential impacts of timber harvest and road construction on maintaining sufficient wildlife habitat for black bear, deer, eagles, furbearers, grouse, and waterfowl. (Issue raised by the Alaska Department of Fish and Game)**

   Management Indicator Species (MIS's) have been identified to reflect the wide variety of wildlife species indigenous to southeast Alaska. Responsiveness to the wildlife habitat issue was evaluated by comparing the amount of habitat for these species that would be disturbed. Computer models were used to analyze needs of Sitka black-tailed deer, pine marten, black bear, river otter, and bald eagles.

2. **Potential impact on water quality and downstream anadromous fish habitat due to timber harvest and road construction. (Issue raised by Southeast Alaska Seiners, Alaska Department of Fish and Game, and several individuals)**

   Indicators of responsiveness to this issue are the miles of fish streams that would have timber harvest close enough to require minimum 100 foot streamside buffers and the number of road crossings on fish streams.

3. **Potential impact of timber harvest and increased road access on subsistence resources and users. (Issue raised by Southeast Alaska Conservation Council and several individuals)**

   a. How will the Forest Service manage the improved access created by roads so as not to significantly increase competition for subsistence resources by subsistence users?

   b. How will the Forest Service maintain sufficient habitat and conditions for subsistence resources so as not to significantly restrict those users or resources?

Issues (cont.)

Analysis focused on evaluating the Tongass Resource Use Cooperative Survey (TRUCS) data and fish and game harvest levels to determine if there is a real possibility that management activities would result in a significant restriction of subsistence uses.

4. **Ability to produce an economically viable timber sale while adequately protecting other resources. (Issue raised by several Individuals)**

   Analysis focused on meeting the mid-market test for profitability to business, and on return to the government. Harvest units were designed by an interdisciplinary team of resource specialists to minimize the impacts on other resources.

5. **Extending Forest Road 6030 to connect Kake and Portage Bay. (Issue raised by several Individuals)**

   From a Forest management standpoint this road connection will significantly improve economics, management flexibility, and safety. Some residents of the Petersburg, Kake and Kupreanof communities, however, believe that this connection may have serious impacts. Two issues are involved:

   a. The proposed road location crosses a portion of LUD II land. These lands are to be managed in a roadless state to retain their wildland character but allow access roads to cross in some cases where necessary to allow access to lands on either side of the LUD II area. The LUD II area in question is a remnant of a larger area, most of which was included in the Petersburg Creek-Duncan Salt Chuck Wilderness.

   b. While the decision to build a Kake-to-Petersburg connection is outside the scope of this project, it is an associated issue that is recognized. If the Kake/Portage Bay road is constructed, it would link existing roads to within 12 miles of Petersburg, possibly generating support for a state decision to build the remaining portion.

   Analysis focused on the proposed and existing road network and LTFs at Portage Bay and Hamilton Bay, and the potential need to connect the community of Kake and the Portage Bay Logging Camp and those existing road networks, while at the same time developing a transportation network in an unroaded area.

6. **Potential impact of road construction on the Petersburg Creek-Duncan Salt Chuck Wilderness and its associated values. (Issue raised by Southeast Alaska Conservation Council and several Individuals)**

   Specific concerns are that increased access may cause use to exceed carrying capacity; and the visibility of the road and associated rock pits and sound from traffic may reduce the quality of the wilderness experience.

   Analysis focused on locating and designing roads and rock pits that minimize impacts to wilderness. For example, the Kake to Portage road connection may not be built or may have seasonal closures.

Issues (cont.)

7. **Potential impacts of timber harvest, road construction, and rock pit development on the landscape's visual character as seen from ferry boats and small recreational boats on Frederick Sound and Portage Bay. (issue raised by several individuals)**

   Specific concerns include which areas are seen and for what duration. Frederick Sound and Portage Bay are highly sensitive travel routes where landscapes are viewed frequently and for long duration. Harvest activities associated with the Portage-Twelvemile Timber Sale, Todahl Timber Sale, and activities on nearby Native lands are likely to affect the viewers' sensitivity toward management activities located in visible portions of the Bohemia Mountain analysis area.

   Visual quality objectives (VQO's) were used to evaluate visual quality. Factors to be considered include visibility, visual variety in the area, and the ability of the area to absorb and mask management activities.

8. **Consideration of Duncan Salt Chuck Creek as suitable for designation to the Wild and Scenic River System. (issue raised by American Rivers and several individuals)**

   This river was identified as a possible candidate for any of the three classes during the comprehensive inventory conducted for the Forest Plan Revision.

   Analysis focused on completing a suitability study report to determine whether or not Duncan Salt Chuck Creek is suitable for possible inclusion in the National Wild and Scenic River System and evaluate the resource tradeoffs.

Opportunities

The IDT identified nine other resource opportunities:

1. To provide additional timber volume to the local timber industry to support a part of the local economy.
2. To identify fish, wildlife, recreation, and other project enhancement opportunities which would become more feasible because of the timber sale.
3. To increase production of wood fiber on harvested portions of land by converting old stands to young, vigorous second growth stands.
4. To connect Portage Bay logging camp to Kake by road.
5. To construct fish passes on Duncan Salt Chuck Creek to remove the barrier and allow salmon to spawn upstream.
6. Possibly to produce the only Wilderness area in southeast Alaska that is accessible by road via trails.
7. Possibly to have opportunity to carry out stream stabilization measures in V-notches on Bohemia Mountain, due to increased access.
8. To enhance Portage Mountain Loop trail.
9. Possibly to construct a wildlife viewing area in Portage Bay (for a variety of wildlife species).

Approvals Required From Other Agencies

A number of agencies have provided, or will provide, information for this EIS, including the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, and the Alaska Department of Natural Resources. The Forest Service also consulted with the Alaska Department of Governmental Coordination to ensure the project was consistent with the Alaska Coastal Zone Management Plan.

As the lead agency for this environmental compliance action, the Forest Service is responsible for the preparation of the EIS. The Forest Service will make decisions based on the EIS, to be documented in the Record of Decision (ROD). The Forest Service has acquired permits from the U.S. Army Corps of Engineers and the Alaska Department of Environmental Conservation. The following permits are on file at the Stikine Area Supervisor's Office:

U.S. Army Corps of Engineers
A single permit from the Corps incorporates requirements for the Clean Water Act and the Rivers and Harbors Act. It also includes U.S. Environmental Protection Agency permits for pollution discharge elimination and spill prevention control and countermeasure. In addition, the Corps permit covers the Alaska Department of Environmental Conservation certificate of reasonable assurance for compliance with Alaska water quality standards. This permit has already been issued for the Little Hamilton log transfer facility in 1982, and the Portage Bay log transfer facility in 1985.

State of Alaska Division of Governmental Coordination
A review coordinated by ADGC determines whether the State agencies agree with the Forest Service determination of consistency with the Alaska Coastal Zone Management Plan.

The permit for both log transfer facilities that may potentially be used for the Bohemia Mountain Timber Sale has already been obtained, along with the State tidelands easement for the use of State tidelands. The Little Hamilton Bay permit expires in 2017 and the Portage Bay log transfer facility permit expires in 2010.

Department of Environmental Conservation
If a new camp is considered, such as a floating camp, rather than using existing camps, the Forest Service will work with DEC to acquire the necessary permits for water, solid waste discharge, and sewer discharge.

Chapter 2

Chapter 2

Introduction

This chapter describes alternative methods of providing short-term timber sales for the independent logging community in southeast Alaska. The project is currently known as the Bohemia Mountain Timber Sale.

Process Used to Formulate Alternatives

Five timber harvest alternatives and a "no action" alternative were developed to respond, in varying degrees, to the issues described in Chapter 1. All of the action alternatives were constructed through the IDT process to achieve multiple resource objectives within the scope of the project analysis.

Design Elements Common to All Action Alternatives

Some of the major design elements common to all action alternatives follow (these do not apply to Alternative 1, the "no action" alternative):

Standard Elements

Riparian Buffers. As required by the Tongass Timber Reform Act, a buffer zone of no less than one hundred feet in width on each side of all Class I streams and on those Class II streams which flow directly into Class I streams is prescribed in all action alternatives for harvest units near such streams.

Roads and Rock Pits. Roads on the east and north slopes of Bohemia Mountain would produce relatively low visual impacts. New roads in Portage Bay would have little or no visual impact. The south route of the mainline road location would offer a more scenic view of the surrounding landscape. In sensitive viewsheds, rock pits would be placed outside of harvest units and screened by trees whenever possible.

Log Transfer Facility (LTF) Alternative 3 would use the existing Portage Bay LTF and Alternative 4 would use the Little Hamilton LTF for the dumping of all roaded timber harvest volume. Alternatives 2, 5, and 5A would use both facilities for roaded timber harvest volume.

Helicopter Logging. Helicopter logging was included in the design of each of the action alternatives, except Alternative 4, in order to provide the opportunity to do small clearcuts with helicopter yarding. To provide an economically feasible helicopter portion of the sale, approximately 150 acres would be harvested in 10- to 20-acre units totalling about 4.5 million board feet (MMBF).

There would be no need to construct additional road. Helicopter-yarded volume will be yarded directly to constructed or existing roaded landings. Some landings would have to be enlarged to facilitate log handling.,

Helicopter units are the same in all of the action alternatives, even though their unit numbers are different.

New Perspective Elements

The Bohemia Mountain timber sale will implement New Perspectives concepts. Below are the New Perspective concepts that were used as design elements common to all timber harvest alternatives.

Internal Exclusions. Some trees within the harvest unit would be left purposely to achieve structural diversity and to visually screen roads and modify blocky unit shapes. These are silviculturally referred to as "leave trees" for green tree deferral. Logging systems may limit the ability to do this.

A process of cutting only small sections of timber would be applied in this sale, in order to mimic blowdown patches in southeast Alaska. This will minimize the effects of timber harvesting in areas of moderate to high visual sensitivity. Impacts to wildlife would approximate those occurring under natural ecological processes. Small stands 10 to 20 acres in size would be harvested using helicopter yarding to a road landing.

Maintenance of Large Blocks of Old Growth. One of the major analyses undertaken was to evaluate old-growth stand conditions and patterns over the entire 67,689-acre analysis area. Most of the timber stands in the area are old growth more than 200 years old. Most of the existing harvested stands are less than 10 years old and the oldest immature stands are approximately 75 years old. All the alternatives incorporate to varying degrees the concept of minimizing entry into large, interconnected blocks of old-growth habitat. Alternatives 1 and 3 maintain four blocks, ranging in size from 1,040 to 7,020 acres. Alternatives 2, 4, 5, and 5A maintain three blocks ranging in size from 1,040 to 7,020 acres (see Table 4-13). This would offer a wider range of landscape management options in the future.

Public Input and Participation. Another component of New Perspectives is public input and participation. The Bohemia Mountain analysis effort will be using some non-traditional methods to seek public input, including taking representatives from outside agencies to the analysis area and explaining possible alternatives at the site.

Maintenance of High Value Wildlife Habitat within Beach Fringe, Riparian, and Estuaries. Wildlife resource inventory maps were generated using Habitat Capability computer models to evaluate habitat quality, size, and juxtaposition throughout the analysis area. The highest quality overall wildlife habitat was identified by generating a mean wildlife Habitat Suitability Index (HSI) using the individual HSI values of the five project management indicator species: bald eagle, Sitka black-tailed deer, black bear, marten, and river otter. All areas with an average HSI of 0.7 or greater were removed from consideration during this project analysis. In general, this area consisted of most habitats occurring within 500 feet of the beach and 1,000 feet of estuarine areas, as well as some selected high quality riparian areas. Avoidance of these habitats in all alternatives resulted in a continuous corridor of high quality habitat extending along the beach fringe throughout the analysis area.

Range of Alternatives

The range of alternatives, as a whole, addresses the issues identified in Chapter 1. Each action alternative is consistent with Land Use Designation II and IV guidelines for management direction in the current Forest Plan.

The volume of timber to be harvested ranges from 10.9 million board feet (MMBF) to 39.6 MMBF, while the "no-action" alternative describes the effects of choosing not to prepare a timber sale. All of the proposed action alternatives, except Alternative 4, would harvest 4.5 MMBF with a helicopter yarding system for small harvest units.The number and shape of units is the same for all alternatives but could change with field examination.

The alternatives were developed and designed using "adjusted" operable commercial forest land (CFL). This designation does not allow timber harvesting on areas with a habitat suitability index of .7 or greater or areas with high hazard soils. Map 3-13 shows the total CFL in the analysis area (25,840 acres). The commercial forest land includes approximately 2,970 acres of inoperable CFL which is not available for harvest. Of the approximately 22,870 acres of operable CFL suitable for harvest, 9,131 acres (40% of the operable CFL) were identified from field surveys and habitat modeling to be .7 HSI or greater.

The first step was identifying CFL (land that can produce at least 8,000 board feet of timber per acre in 100 years). To minimize landslides, all the inventoried high hazard soil areas were initially removed from this base. The interdisciplinary team (IDT) then developed a multi-entry layout plan for harvesting the remaining inventoried CFL.

Field reconnaissance and additional photo interpretation showed that some of the timber identified in this layout plan was on the border of being non-commercial (less than 8,000 board feet per acre). Areas of muskeg, when feasible, were removed from the timber stand data base in an attempt to calculate accurate volume and acreage figures. More field verification will be done during the 1991 field season, before completion of the Final Environmental Impact Statement (EIS).

As stated earlier, the operable CFL was further "adjusted" by removing all timber within 500 feet of the beach and 1,000 feet of estuaries (.7 and greater HSI values). Minimal timber harvest activities would be proposed in these areas in order to protect most high value wildlife habitat (HSI .7 or greater). All harvest proposals have been developed using the adjusted operable CFL.

Alternatives Considered but Eliminated from Detailed Study

The Forest Service considered a range of alternatives in order to identify a reasonable set of alternatives to be studied in detail. One that was eliminated from detailed study, along with the rationale for its dismissal, follows:

Two LTF's

A first cut analysis of the proposed Bohemia Mountain Timber sale indicated substantial log haul cost savings by developing the transportation system to include a new log transfer facility (LTF) on the west side of Portage Bay. Subsequent environmental analysis pointed out that the cumulative impacts from two LTF's in this relatively small, shallow bay would not be acceptable. This alternative was therefore eliminated from detailed study.

Alternatives Considered in Detail

The Forest Service developed five action alternatives and one "no action" alternative for detailed analysis. Each of these alternatives provides protection for resources; each responds to resource management opportunities such as timber harvest, wildlife habitat management, and visual resource management; and each addresses issues the public and Forest Service identified in Chapter 1. However, each alternative provides a different mix of resource outputs that emphasizes different resource values.

Assuming an action alternative is selected and the Bohemia Mountain timber sale is implemented, there will likely be some minor changes to the units and roads as they are described in the Draft EIS. It is impossible to put these plans into effect on the ground without responding to conditions that were not anticipated. For example, sometimes this means developing additional protection for a resource value that had not been recognized. Consequently, all boundaries, acreages, volumes, and road locations should be considered "best estimates" at the time this DEIS is published.

Spur roads are not displayed on Maps 2-2 through 2-5A because their locations may change, with Forest Service approval, according to operator needs and equipment requirements. The spur road mileage listed is an estimate of the amount of road a prudent operator may require.

Alternative 1

ALTERNATIVE 1 (*No Action Alternative*) was designed as the "no action" alternative, in which no new timber harvest or road construction activities would occur. Management of the analysis area would continue in its current condition.

ALL LOGGING SYSTEMS	CABLE LOGGING SYSTEMS	HELICOPTER LOGGING SYSTEMS
0 MMBF timber	*0 MMBF timber*	*0 MMBF timber*
0 harvest acres	*0 harvest acres*	*0 harvest acres*
0 miles specified road		
0 miles spur road		

Wildlife. Alternative 1 maintains the existing wildlife habitat in its present condition.

Water and Fisheries. No new entries would be made into Class I or Class II fish stream watersheds.

Subsistence. Because there would be no new access to currently unused areas, no additional competition for subsistence resources would occur.

Timber. Alternative 1 was evaluated to assess the impact of allowing the current management in the area to continue without a timber sale, and to provide baseline information against which other alternatives were measured. Currently there is approximately 145 MMBF which could be accessed from the existing road system over the rotation.

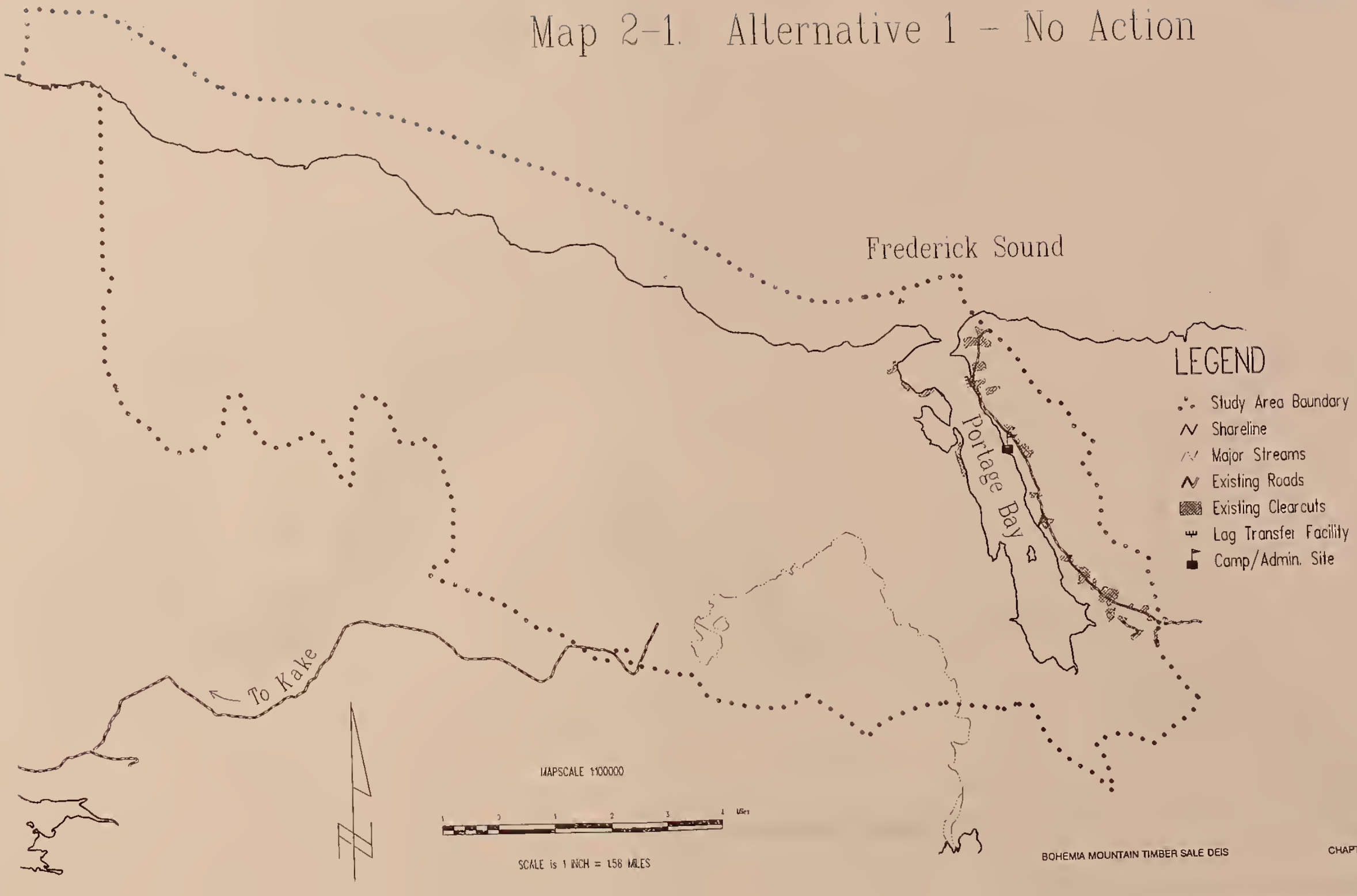
Kake/Portage Connection. The road connection would not be built and the Kake and Portage road network systems would not be connected.

Wilderness. Alternative 1 would cause no impacts to the Petersburg Creek-Duncan Salt Chuck Wilderness.

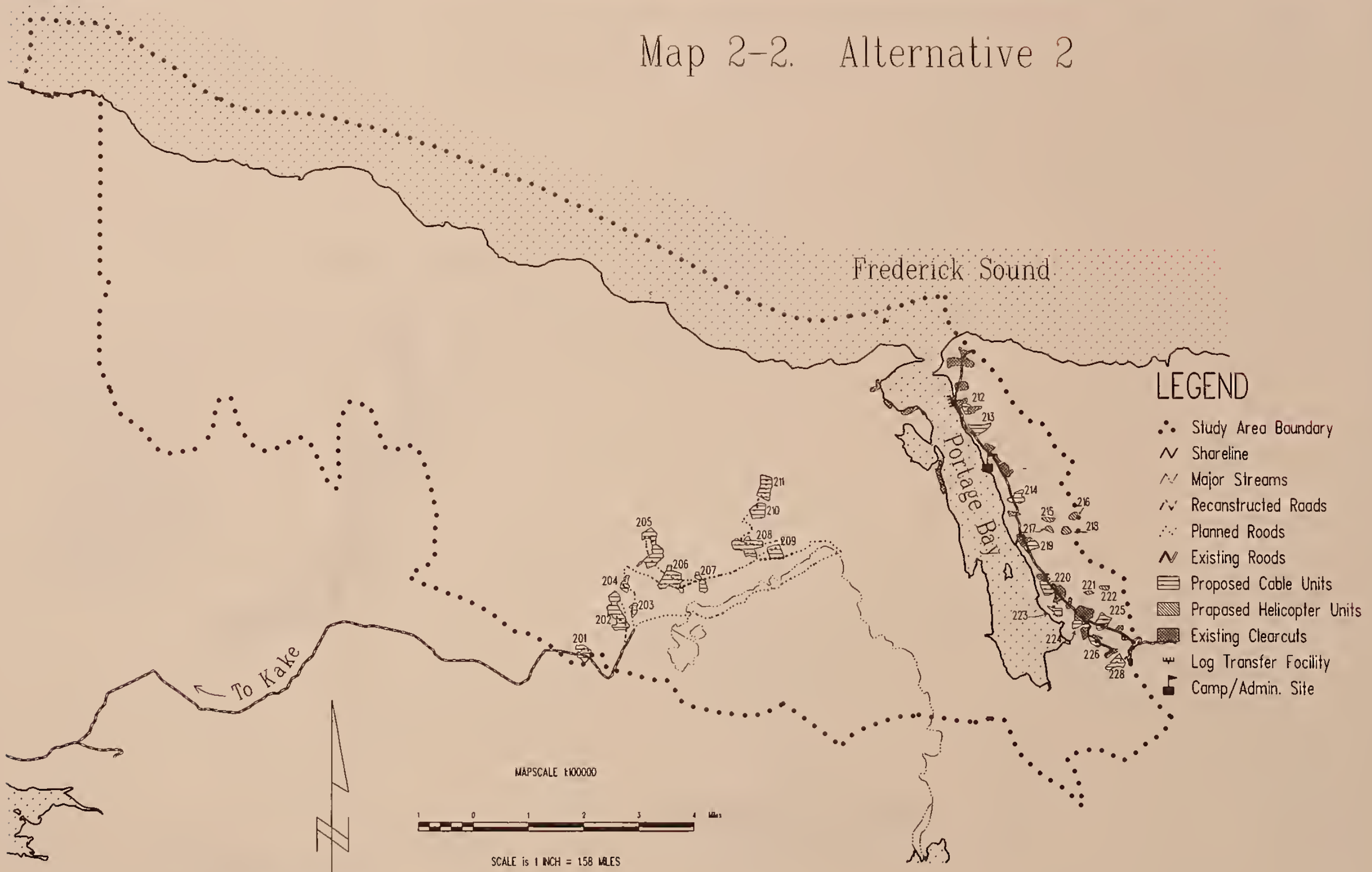
Visual Quality. Alternative 1 would maintain the area in its present visual condition. The landscape east of Portage Bay would be allowed more time to visually recover from 1984 harvest activities, which currently meet a "partial retention" visual quality objective (VQO). The area west of Portage Bay would appear untouched by human activities.

Wild & Scenic River. Recommendation for possible inclusion in the National Wild and Scenic River System would not be made as a result of this analysis. Any recommendation would be made as part of the Forest Plan revision.

Map 2-1. Alternative 1 – No Action



Map 2-2. Alternative 2



Alternative 2

ALTERNATIVE 2 provides for moderate harvest while maintaining old growth blocks, meets wilderness concerns,and minimizes fragmentation.

ALL LOGGING SYSTEMS	CABLE LOGGING SYSTEMS	HELICOPTER LOGGING SYSTEMS
24.8 MMBF timber *974 harvest acres* *9.9 miles specified[1] road (north route)* *14.1 miles specified road (south route)* *3.1 miles spur[2] road*	*20.3 MMBF timber* *824 harvest acres*	*4.5 MMBF timber* *150 harvest acres*

Wildife. Alternative 2 would harvest only 9 acres of high value (HSI .7 or greater) riparian wildlife habitat (see Map 3-8 and Table 4-10).

Water and Fisheries. This alternative would construct 13 miles (north route) or 17.2 miles (south route) of road requiring nine stream crossings to harvest 974 acres with 2 miles of stream buffer.

Subsistence. Competition for subsistence resources may increase as approximately 10 miles (north route) or 14 miles (south route) of permanent specified road would increase accessibility and might produce increased competition.

Timber. Alternative 2 would harvest seven percent of the adjusted operable CFL. Map 2-2 displays the unit locations, Portage Bay LTF, and specified road system as designed. This alternative provides for moderate harvest while maintaining old growth blocks and minimizing fragmentation to protect high value (HSI .7 or greater) wildlife habitat.

The helicopter logging units within this alternative are the same for alternatives 3, 5, and 5A. They consist of helicopter clearcut yarding units.

Depending on the mainline road location, the dollar value per thousand board feet ($/MBF) ranges from -$29 to -$45. It is likely that the money would not be returned to the government in the first entry due to road construction costs; however, future entries would probably be positive.

Kake/Portage Connection. The connection would not be built and harvest units on Bohemia Mountain would be hauled to Little Hamilton LTF.

Wilderness. Alternative 2 would cause no impacts to the Petersburg Creek-Duncan Salt Chuck Wilderness.

Visual Quality. Alternative 2 would visually affect Portage Bay, with minor visual impacts to Frederick Sound. Past and proposed activities east of Portage Bay would maintain an appearance of "partial retention." West of Portage Bay, proposed units would likely meet a "partial retention" VQO. Within stand modification (that is, unit boundary changes and leaving clumps of green trees within a unit) would be recommended for two units to meet inventory VQO's.

Wild & Scenic River. Alternative 2 would recommmend designation of Segment 1 as a "wild river" and Segment 2 as a "scenic river" which would allow a road to cross the river and reach Bohemia Mountain.

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[1] The location of the road and the construction requirements are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

[2] Spur roads are usually less than 1/2 mile long. The location is selected by the contractor and approved by the Forest Service. Spur roads are sometimes referred to as temporary or non-system roads.

Alternative 3

ALTERNATIVE 3 was developed for two reasons: to provide a positive return to the Treasury and to maintain key wildlife habitat since units are concentrated in Portage Bay and fragmentation is minimized. It returns money to the Treasury since little additional road construction would occur.

ALL LOGGING SYSTEMS	CABLE LOGGING SYSTEMS	HELICOPTER LOGGING SYSTEMS
10.9 MMBF timber	*6.4 MMBF timber*	*4.5 MMBF timber*
384 harvest acres	*234 harvest acres*	*150 harvest acres*
0.5 miles specified[1] road		
1.2 miles spur[2] road		

Wildlife. Nine acres of high value (HSI .7 or greater) riparian wildlife habitat would be harvested.

Water and Fisheries. Construction of 1.9 miles of additional road would require no new stream crossings, although 18 exist from previous road building and timber harvesting in east Portage Bay. 384 acres would be accessed and 2 miles of stream would be buffered.

Subsistence. This alternative would have little effect on subsistence resources in Portage Bay and no effect on Bohemia Mountain.

Timber. Alternative 3 would harvest three percent of the adjusted operable CFL. Map 2-3 displays the unit locations, LTF, and specified road system as designed. The helicopter logging units within this alternative are the same for Alternatives 2, 5, and 5A. They consist of helicopter clearcut yarding units.

This alternative provides a positive return of $60/MBF under the current mid-market analysis.

Kake/Portage Connection. The connection would not be built and Portage Bay LTF would be used.

Wilderness. Alternative 3 would cause no impacts to the Petersburg Creek-Duncan Salt Chuck Wilderness.

Visual Quality. Alternative 3 would visually affect Portage Bay as some units may be visible from Frederick Sound. Past and proposed activities would likely maintain an appearance of "partial retention" and would not further affect the view of persons anchored near the mouth of Portage Bay. The landscape west of Portage Bay would appear untouched by human activities.

Wild & Scenic River. No designation would be recommended under this alternative since the proposed activities do not affect the river. Analysis of the suitability of Duncan Salt Chuck Creek would occur during the Forest Plan Revision process.

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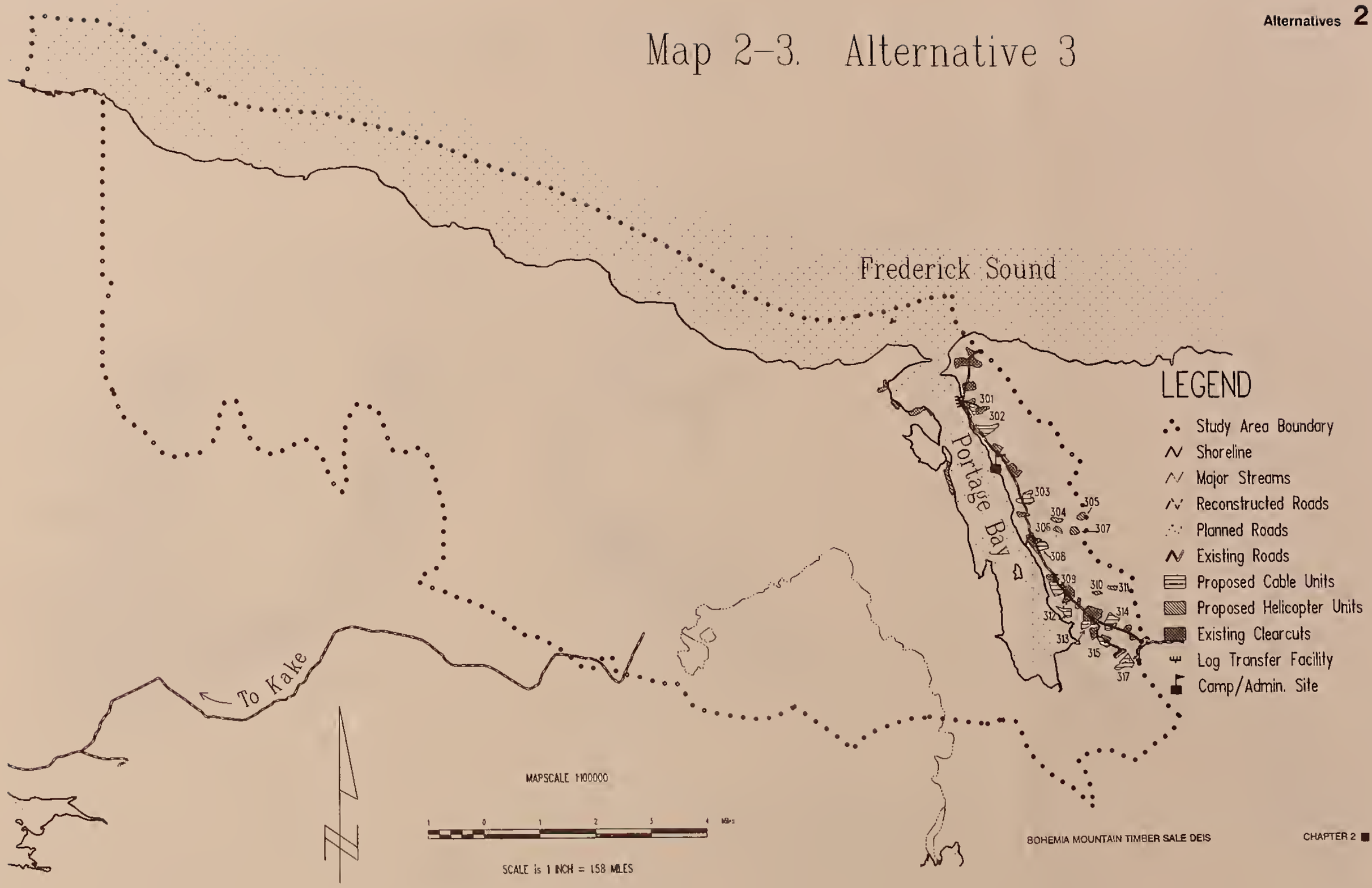
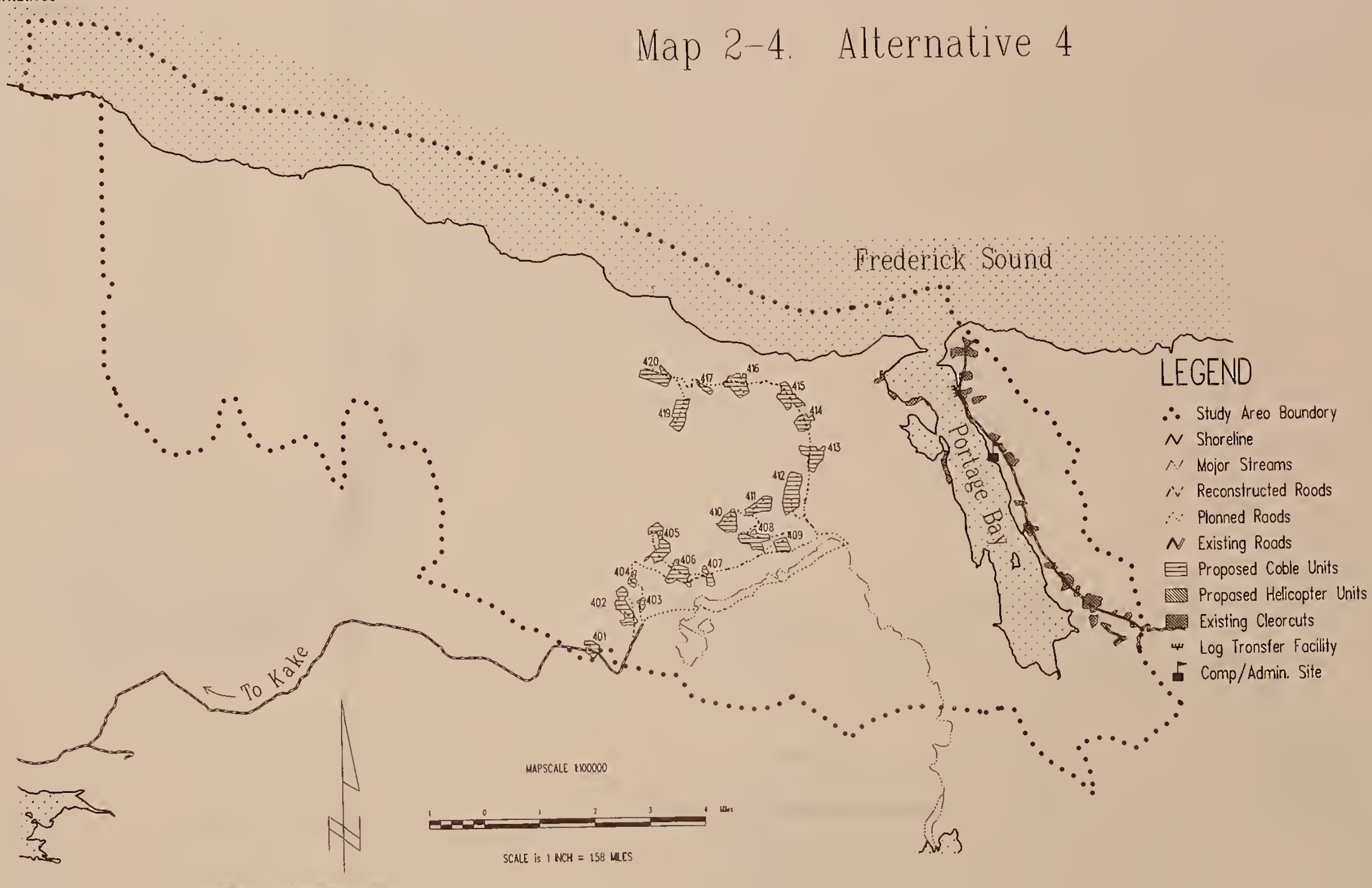
[1] The location of the road and the construction requirements are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

[2] Spur roads are usually less than 1/2 mile long. The location is selected by the contractor and approved by the Forest Service. Spur roads are sometimes referred to as temporary or non-system roads.

Map 2-3. Alternative 3



Map 2-4. Alternative 4



Alternative 4

ALTERNATIVE 4 was designed to provide strong amenity protection and maintain options for future management. No new harvest units would occur in Portage Bay, thus allowing existing units more time to mature.

ALL LOGGING SYSTEMS	CABLE LOGGING SYSTEMS	HELICOPTER LOGGING SYSTEMS
23.2 MMBF timber	*23.2 MMBF timber*	*0 MMBF timber*
1040 harvest acres	*1040 harvest acres*	*0 harvest acres*
18.3 miles specified[1] road (north route)		
21.5 miles specified road (south route)		
2.8 miles spur[2] road		

Wildlife. This alternative harvests 32 acres of high value (HSI .7 or greater) riparian wildlife habitat (see Map 3-8).

Water and Fisheries. 21.1 miles (north) or 24.3 miles (south) of road would be constructed requiring 21 additional stream crossings to access 1040 harvest acres having 3 miles of buffers.

Subsistence. Approximately 18 miles (north route) or 22 miles (south route) of permanent specified road would provide additional access and might increase competition for subsistence resources.

Timber. Alternative 4 would harvest eight percent of the adjusted operable CFL. Map 2-4 displays the unit locations, LTF, and specified road system as designed. No helicopter units are included in this alternative.

The sale does not meet the mid-market analysis for profitability. Depending on the mainline road location, the $/MBF values range from -$102 (north route) to -$111 (south route). Once the mainline roads are constructed, future entries would probably have a positive return.

Kake/Portage Connection. The connection would not be built and timber would be hauled to Little Hamilton LTF.

Wilderness. Alternative 4 would cause no impacts to the Petersburg-Creek Duncan Salt Chuck Wilderness.

Visual Quality. Alternative 4 would visually affect Portage Bay and Frederick Sound. This is the only alternative which allows the landscape east of Portage Bay more time to visually recover before another entry. Proposed harvest west of Portage Bay would result in a visual condition ranging from "partial retention" to "modification". Within-stand modification would be recommended to soften the effects of three combined units. Portions of six units would be seen from Frederick Sound, resulting in a visual condition of "partial retention". Again, within-stand modification is recommended.

Wild & Scenic River. This alternative would not recommend Segment 2 of Duncan Salt Chuck Creek for designation. This would allow a road to cross the river. Segment 1 would be recommended as a Wild River (within the Wilderness).

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[1] The location of the road and the construction requirements are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

[2] Spur roads are usually less than 1/2 mile long. The location is selected by the contractor and approved by the Forest Service. Spur roads are sometimes referred to as temporary or non-system roads.

Alternative 5

ALTERNATIVE 5 was designed to harvest the most volume and build the Kake/Portage road connection. Harvest units are located on the south and east sides of Bohemia Mountain and in east Portage Bay.

ALL LOGGING SYSTEMS	CABLE LOGGING SYSTEMS	HELICOPTER LOGGING SYSTEMS
39.6 MMBF timber *1635 harvest acres* *28.1 miles specified[1] road (north route)* *31.4 miles specified[2] road (south route)* *6.1 miles spur road*	*35 MMBF timber* *1485 harvest acres*	*4.5 MMBF timber* *150 harvest acres*

Wildlife. This Alternative and Alternative 5A harvest the greatest amount of high value (HSI .7 or greater) riparian wildlife habitat, 41 acres. Road would be constructed through important wildlife area at the south end of Portage Bay.

Water and Fisheries. 34.2 miles (north) or 37.5 miles (south) of road would be constructed requiring 30 additional stream crossings to access 1,635 harvest acres having 5 miles of buffers.

Subsistence. Alternative 5 has the greatest potential to affect subsistence resources. The Kake/Portage road connection would be constructed, allowing users from Kake to reach Portage Bay via road and vice versa, thus possibly increasing competition.

Timber. Alternative 5 harvests the most volume, 39.6 MMBF, and builds the greatest amount of road, 34.2 miles (north) or 37.5 miles (south). It is the only alternative that builds the Kake/Portage connection. The helicopter logging units in this Alternative are the same for Alternatives 2, 3, and 5A. They consist of helicopter clearcut yarding units.

Depending on the mainline road location, the range of $/MBF values is -$78/MBF (north route) to -$85/MBF (south route). Once the mainline roads are constructed, future entries would probably have a positive return.

Kake/Portage Connection. This is the only alternative that builds the connection. Both Portage Bay and Little Hamilton LTF's could be used. The shortest haul distance would be calculated and volume from Bohemia Mountain could be hauled to Portage LTF. This connection affects some high value (HSI .7 or greater) estuarine wildlife habitat.

Wilderness. Approximately 160 acres of semi-primitive non-motorized ROS setting within the Wilderness would change to a roaded modified setting. If the road connection is built, Petersburg Creek-Duncan Salt Chuck Wilderness would be the only Wilderness in Southeast Alaska accessible by road and trail. This provides for a new user group which is likely to be comprised of mostly out-of-state residents.

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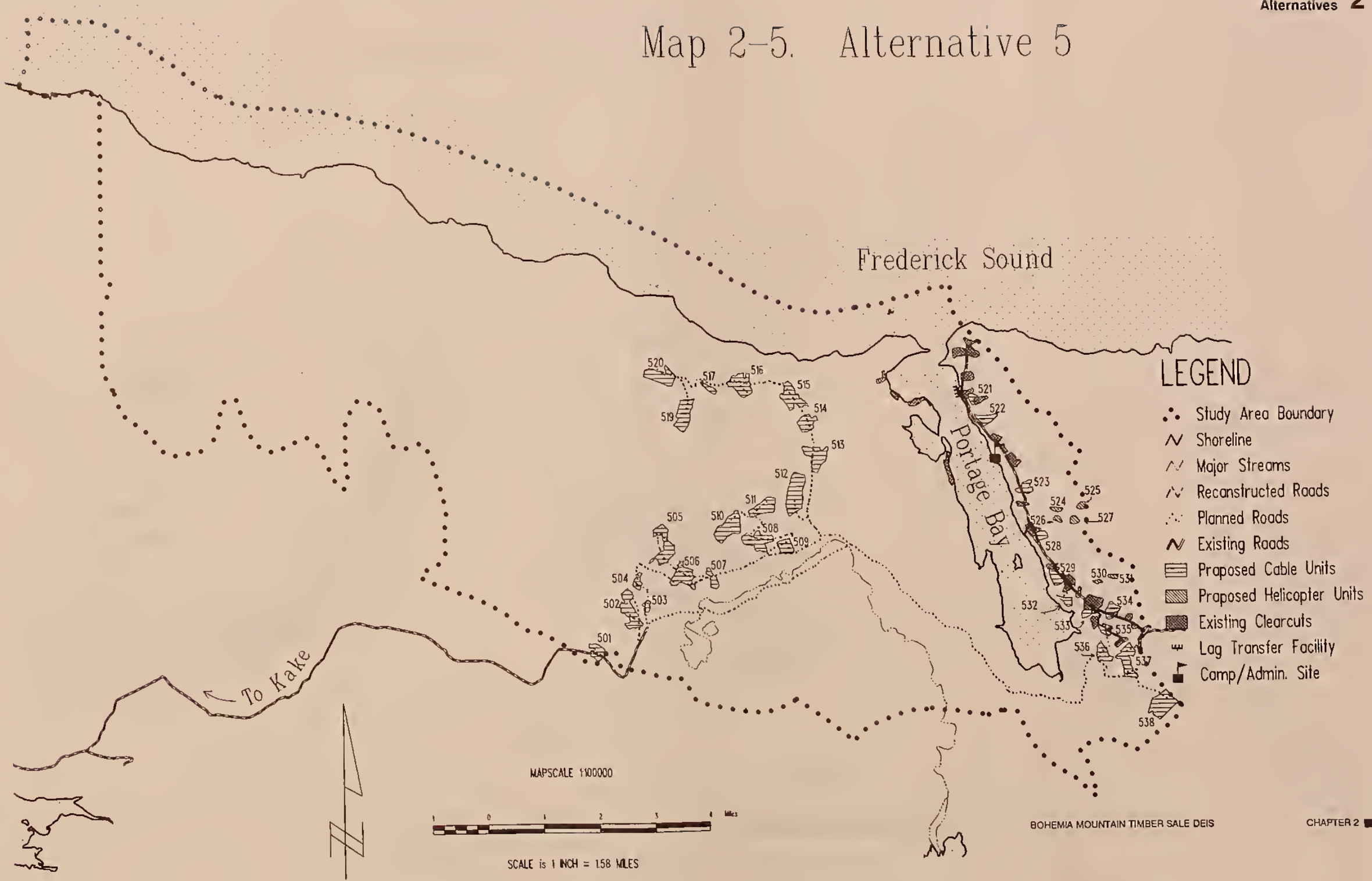
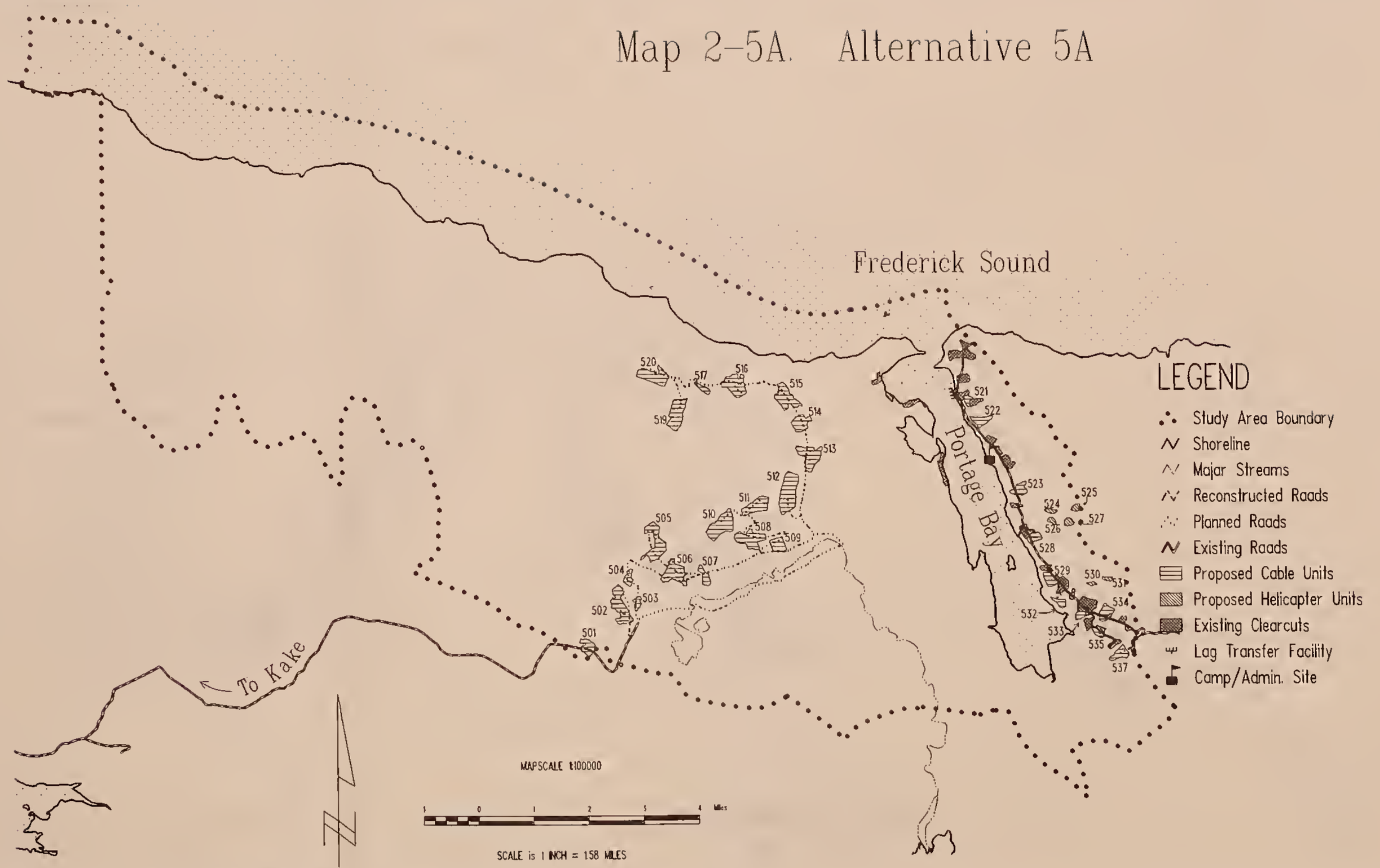
[1] The location of the road and the construction requirements are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

[2] Spur roads are designed for short term project needs to provide access between harvest units and specified roads. Spur roads are sometimes referred to as temporary or non-system roads.

Map 2-5. Alternative 5



Map 2-5A. Alternative 5A



Visual Quality. Alternative 5 would visually affect Portage Bay and Frederick Sound to a greater degree than Alternatives 3 and 4 combined. East of Portage Bay, impacts of past and proposed activities would likely meet a "partial retention" VQO near the mouth and a "modification" VQO near the head of the bay. Within-stand modification is recommended for one unit. As seen from Portage Bay, activity west of the bay would likely produce a visual condition of "partial retention" to "modification." Within-stand modification will help mitigate the combined effects of three units, as well as six additional units seen from Frederick Sound.

Wild & Scenic River. Designation of Segment 1 (within the Wilderness) as a "wild river" would not affect implementation of this alternative. This alternative would recommend Segment 2 (from the Wilderness boundary upstream to Bohemia Lake) for "scenic" designation, which allows a bridge to cross the river and access Bohemia Mountain.

Alternative 5A

ALTERNATIVE 5A was designed the same as Alternative 5 but does not build the road connection and harvests 4.7 MMBF less volume.

ALL LOGGING SYSTEMS	CABLE LOGGING SYSTEMS	HELICOPTER LOGGING SYSTEMS
34.8 MMBF timber	30.3MBF timber	4.5 MMBF timber
1456 harvest acres	1306 harvest acres	150 harvest acres

19 miles specified[1] road (north route)
22.2 miles specified[2] road (south route)
4.5 miles spur road

Wildlife. This Alternative and Alternative 5 harvest the greatest amount of high value (HSI .7 or greater) riparian wildlife habitat, 41 acres.

Water and Fisheries. 23.5 miles (north) or 26.7 miles (south) of road would be constructed, requiring 21 additional stream crossings to access 1,456 harvest acres having 4 miles of buffers. Aquatic habitat management unit requirements would be applied to 11.10 miles of streams. Harvest would not occur on 35 acres of high hazard soils unless field examination shows that the classification should be changed.

Subsistence. 19 miles (north) or about 22 miles (south) of permanent specified road would be constructed, providing additional access which may increase competition for subsistence resources.

Timber. Alternative 5A harvests the second largest amount of volume (34.8 MMBF) and builds the second greatest amount of roads. This alternative is the same as Alternative 5 except three units west of Portage Creek are not included since the road connection is not built. The helicopter logging units in this Alternative are the same for Alternatives 2, 3, and 5. They consist of helicopter clearcut yarding units.

Depending on the mainline road location, the range of $/MBF values is -$54/MBF (north route) or -$60/MBF (south route).

Kake/Portage Connection. The connection is not built. Both Portage Bay and Little Hamilton LTFs would be used.

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[1] The location of the road and the construction requirements are specified by the Forest Service. Specified roads are sometimes referred to as permanent or system roads.

[2] Spur roads are designed for short term project needs to provide access between harvest units and specified roads. Spur roads are sometimes referred to as temporary or non-system roads.

Visual Quality. Alternative 5A would visually affect Portage Bay and Frederick Sound to a similar degree as Alternatives 3 and 4 combined. East of Portage Bay, past and proposed activities would likely maintain an appearance of "partial retention." West of Portage Bay, the visual condition would likely meet a "partial retention" or a "modification" VQO. Within-stand modifications would be recommended for the combined effects of three units and also six additional units partially seen from Frederick Sound. Portage Bay units would likely meet a VQO of "retention" as they green up.

Wilderness. Alternative 3 would cause no impacts to the Petersburg Creek-Duncan Salt Chuck Wilderness.

Wild & Scenic River. Segment 1 would be recommended for designation as a Wild River. Segment 2 would be recommended for Scenic designation, which allows a bridge to cross the river and access Bohemia Mountain.

Table 2-1. Comparison of Alternatives

ELEMENT OF PROPOSAL	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 5A
TIMBER HARVEST						
Total volume (MMBF)	0	24.8	10.9	23.2	39.6	34.9
Area harvested:						
Acres proposed	0	974	384	1,040	1,635	1,456
Cumulative acres	434	1,408	818	1,474	2,069	1,890
Total commercial forest land (CFL) (out of 25,840 acres)						
Percent proposed	0	4	1	4	6	6
Cumulative percent	2	5	3	6	8	7
Adjusted operable CFL (out of 13,739 acres)						
Percent proposed	0	7	3	8	12	11
Cumulative percent	3	10	6	11	15	14
Standard adjusted operable CFL (can be harvested with standard cable logging systems)						
Acres proposed	0	824	234	1,040	1,485	1,306
Cumulative acres (out of 7,595 acres)	434	1,258	668	1,474	1,919	1,740
Percent proposed	0	11	3	14	20	17
Cumulative percent	6	17	9	19	25	23
Non-standard adjusted operable CFL (requires helicopter)						
Acres proposed	0	150	150	0	150	150
Cumulative acres (out of 6144 acres)	0	150	150	0	150	150
Percent proposed	0	2	2	0	2	2
Cumulative percent	0	2	2	0	2	2
Units over 100 acres	0	0	0	0	0	0

Table 2-1. Comparison of Alternatives (continued)

ELEMENT OF PROPOSAL	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 5A
ROAD CONSTRUCTION						
Miles of specified road construction						
North route	4	9.9	0.5	18.3	28.1	19.0
South route	0	14.1	0.5	21.5	31.4	22.2
Miles of spur road construction	0	3.1	1.7	2.8	6.1	4.5
Miles of reconstruction	0	1.2	1.2	0	1.3	1.2
VISUAL QUALITY						
Cumulative effects of management would be consistent with the following Visual quality objectives						
Seen from Frederick Sound (TLMP direction PR-M)	R	R-PR	P-R	R-PR	PR-M	PR-M
Seen from Portage Bay (TLMP direction PR-MM)	PR	PR-M	PR-M	PR-M	PR-M	PR-M
Visibility of proposed activities						
Percent total seen CFL affected*						
Bohemia Mtn. VCU (424)	0	17	0	45	44	44
Portage Bay VCU (442)	88	84	84	0	68	84
(Note: *In VCU 424, the seen CFL makes up 30 percent of the total CFL. In VCU 442, the seen CFL makes up 80 percent of the total CFL.						
Cumulative percent of seen CFL harvested*						
Bohemia Mtn. VCU (424)	0	2	0	11	11	11
Portage Bay VCU (442)	10	18	18	0	21	18
(Note: *Of VCU 424, 9 percent is seen CFL; of VCU 442, 28 percent is seen CFL. The numbers shown are percents of these totals; that is, past and proposed harvest with Alternative 2 would modify 18 percent of the 28 percent that is available in the Portage Bay VCU.)						
WATER QUALITY/FISH HABITAT						
Miles of buffered fish streams						
Proposed	0	2	2	3	5	5
Cumulative	0	2	2	3	6	6
Miles of unbuffered streams						
Proposed	0	4	2	4	6	6
Cumulative	.5	4	2	4	8	8
Number of stream crossings						
Proposed	0	9	0	21	30	21
Cumulative	18	27	18	39	48	39

Table 2-1. Comparison of Alternatives (continued)

ELEMENT OF PROPOSAL	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 5A
Number of fish watersheds (out of 10 total) affected by alternative						
Proposed	0	4	1	3	5	5
Cumulative	1	4	1	4	5	5
Average percentage of fish stream watershed area harvested						
Proposed	0	.8	.3	1.6	2.4	1.9
Cumulative	.3	1.1	.6	1.9	2.7	2.2
WILDLIFE						
High value habitat acres harvested	0	9	9	32	41	41
Percentage of current habitat capability (see glossary) maintained	100	95	98	94	93	93
Number of large forest blocks remaining	4	3	4	3	3	3
Average size (acres)	2921	3097	2884	2302	2252	2252
SUBSISTENCE						
Extent of impact on subsistence use (none/minor/major/ significant)	none	minor	minor	minor	minor	minor
EMPLOYMENT						
Number of timber jobs generated	0	174	76	163	277	244
Dollar value of jobs ($million)	0	5.74	2.51	5.38	9.14	8.05
Dollar value secondary ($million)	0	40.18	17.57	37.66	63.98	56.35
ECONOMICS						
Total pond log selling value (minus 60% normal profit) $/MBF	0	254	265	243	251	250
Total costs to operator ($/MBF)						
North route	0	283	205	345	329	304
South route	0	299	205	342	336	310
Net initial entry return ($/MBF)						
North route	0	-29	60	-102	-78	-54
South route	0	-45	60	-111	-85	-60

Identification of the Forest Service Preferred Alternative

The Bohemia Mountain ID Team met with the Stikine Area Management Team (Forest Supervisor and staff officers) to select the alternative preferred by the Forest Service.

After reviewing all resource impacts, consequences, and opportunities, **Alternative 5A** was identified as the preferred alternative.

Mitigation

The following steps would be required as part of the timber sale implementation to mitigate consequences:

(a) Minimum 330-foot buffers would be maintained around eagle nest trees.

(b) The wildife maintenance areas (combined Habitat Suitability Index (HSI) .7 or greater) would be deferred from timber harvesting for all alternatives for this sale.

(c) All known or discovered cultural sites would be protected. If additional sites are discovered once the sale is in operation, protective measures will be taken under the timber sale contract provisions.

(d) Full bench construction and end hauling of excess excavated material would be required on designated areas for soil stability.

(e) Pursuant to the Tongass Timber Reform Act, commercial timber harvesting within a buffer zone no less than one hundred feet in width on each side of all Class I streams and those Class II streams which flow directly into a Class I stream would be prohibited. In addition, stream protection would include provision of buffer areas and other protective actions consistent with aquatic habitat management unit (AHMU) guidelines pertaining to (1) unstable banks, (2) temperature sensitivity, (3) sedimentation, and (4) large, woody debris for rearing habitat, nutrient retention, and streambed stabilization.

(f) Where deemed necessary, non-buffered channels would receive protection, such as removal of all introduced slash to prevent debris loading and subsequent washout (see *Best Management Practices Handbook*--2509.22).

(g) The visual resource would be protected to the extent required to meet the visual quality objectives for the Bohemia Mountain analysis area as stated in the current Forest Plan. Boundaries on units would be adjusted to reduce the impact on the view from Frederick Sound and Portage Bay. Landscape design principles would be used to locate and design rock pits, sort yards, and other related facilities.

(h) Rock pit and roadside rehabilitation would be applied as needed, and may include planting tree seedlings and spraying rock weathering agents to allow a better blending with the natural surroundings.

(i) Road construction impacts within LUD II lands will be kept within the approved road corridor to the extent practicable.

(j) Rock pits which must be developed within LUD II areas will be analyzed for future suitability and need for road maintenance. Those not needed would be rehabilitated according to an approved pit plan.

Monitoring

Monitoring is designed to determine if the resource management objectives of the Bohemia Mountain timber sale analysis have been met. The results will be used to verify implementation and effectiveness of selected mitigation and protection measures in a timely manner. Three types of monitoring were recognized in the development of the monitoring plan as listed below:

Implementation Monitoring

Implementation monitoring assesses whether the project was implemented as designed and whether it complies with the current Forest Plan. In completing the Bohemia Mountain analysis, specialists used on-the-ground inventories, computer inventories, and aerial photographs to design harvest units and roads. Unit and road cards containing all pertinent information will be developed prior to field layout of the approved project.

Following completion of harvest activity, development impacts will be compared to those described in the Bohemia Mountain Timber Sale EIS to identify significant differences from what was anticipated. This information, when and where pertinent, will be noted and added on the unit and road cards. By the end of the timber sale activities, the cards will document the initial plan, the rationale for any changes, and show the project as implemented.

Effectiveness Monitoring

Effectiveness monitoring measures the effectiveness of design features or mitigation measures. The following effectiveness monitoring may be performed following implementation of an action alternative:

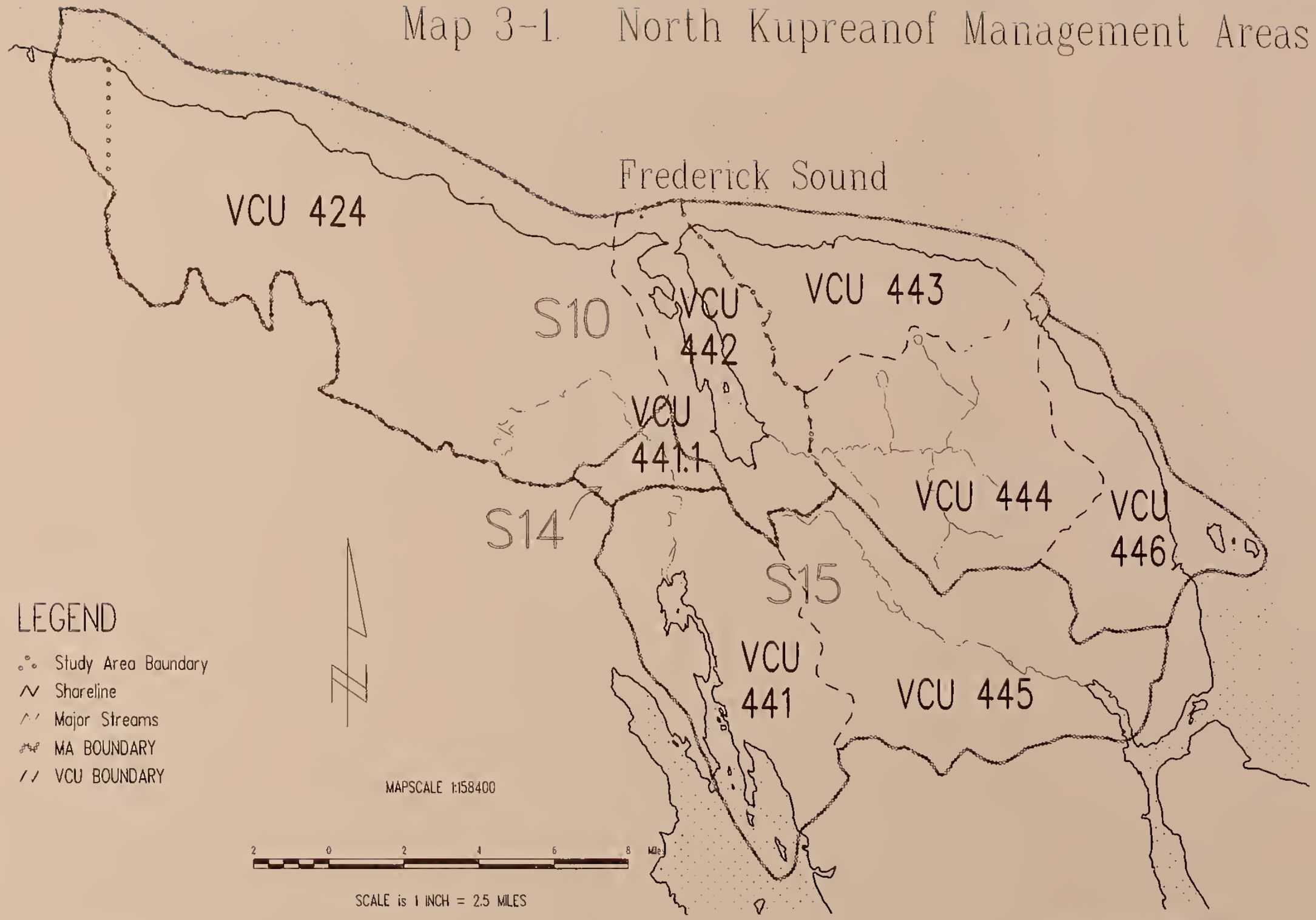
- Check the effects of implementation on deer winter range in east Portage Bay (wildlife biologist).
- Ensure no long term decrease in soil productivity (soil scientist).
- Monitor harvest implementation and the resulting effects on the visual resource, to see if the project is implemented as planned and if the actual impacts are as anticipated in the environmental document (landscape architect).
- Note the effectiveness of implemented BMPs (soil scientist and hydrologist).
- Check the integrity of the buffer strips (fisheries biologist).
- Monitor the effectiveness of stream rehabilitation and enhancement projects (fisheries biologist).
- Certify natural regeneration of stands 3-5 years following harvest (silviculturist).
- Schedule all harvest stands for precommercial thinning between 12 and 20 years of age (silviculturist).
- If blowdown occurs, recommend for follow-up of the project design (silviculturist).
- Monitor recreation use resulting from increased road access, including the Bohemia Lake area and areas along the road system (recreation).
- Monitor increase in competition for subsistence resources if there is an increased use (subsistence coordinator).
- Monitor the prescribed road maintenance level to determine if it's the appropriate level and measures are working as intended (transportation planner).

Validation Monitoring

Validation monitoring is conducted to validate assumptions made about resource effects. With possible support from the Forestry Sciences Laboratory, the Area wildlife biologists and ecologists may monitor and study the impacts of implementing New Perspective concepts as necessary and feasible.

Chapter 3

Map 3-1. North Kupreanof Management Areas



Chapter 3

Introduction

This chapter describes the environment of the Bohemia analysis area that would affect, or be affected by, any of the proposed alternatives. The information has been taken from more detailed reports that are available for public review in the planning record, located in the Supervisor's Office, Stikine Area, Petersburg, Alaska.

Forest Plan Guidance

The Tongass Land Management Plan (TLMP) defines land use opportunities and provides land management direction for the Tongass National Forest.

The Bohemia Mountain analysis area falls within the TLMP Portage Management Area S10 (see Map 3-1). TLMP allocated Value Comparison Units (VCU's) 424 and 442 to a land use designation (LUD) IV which emphasizes commodity uses allowing timber harvest. A small portion of the analysis area falls within TLMP Salt Chuck Creek Management Area S14. VCU 441 was allocated to LUD II which emphasizes management in a roadless state, but the following activities would be allowed: wildlife and fish habitat improvement projects, roads that are vital transportation links, and timber harvesting to control insect infestations.

The Plan's specific management direction and emphasis in this area will be utilization of timber resources within the constraints set forth in the Regional Guide and Forest Plan. Proposed sale areas will link with the road system providing access to the community of Kake. The Kake/Portage road connection is expected to pass through VCU 441 if it is constructed. The transportation management objective is to connect the road system in this management area to that of the rest of Kupreanof Island if economically and environmentally feasible, and to continue to maintain the log transfer facility and logging camp in Portage Bay.

Important deer winter range will be protected, especially along the Frederick Sound shoreline. Wildlife habitat improvement projects and mitigation measures would be developed on a case-by-case basis.

Trails would be constructed from existing roads to access Petersburg Creek-Duncan Salt Chuck Wilderness if consistent with the Wilderness Management Plan.

The anchorage in Portage Bay would be protected for enhancement of recreational activities, including waterfowl hunting.

Activities would be coordinated with Native lands on the west side of the management area whenever possible.

Visual quality objectives would range from "partial retention" to "maximum modification," with the higher objectives being applied on those lands viewed from the ferry lane in Frederick Sound.

For a more detailed description of TLMP and its management direction see the Tongass Land Management Plan and Tongass Land Management Plan Amended Winter 1985-86.

The Tongass Land Management Plan is currently being revised. As part of the revision process, changes in Management direction for the Bohemia Mountain analysis area will be considered. Management activities will continue under the direction of the current plan until the revision process is completed. The proposed timber sale is consistent with the current Plan direction and is scheduled to be sold prior to completion of the Forest Plan Revision.

Watershed

Drainage Basin

Description

The Bohemia analysis area includes portions of 49 watersheds whose streams terminate at saltwater, creating a watershed analysis area of about 76,660 acres with approximately 250 miles of inventoried stream. (This total acreage figure does not match the total acreage figure for the analysis area because of analyzing entire watersheds, some of which go outside the analysis area boundary). The Alaska Department of Fish and Game (ADF&G) catalog indicates that 10 of these 49 watersheds contain streams used by anadromous fish. These ADF&G watersheds total about 52,790 acres with about 180 miles of inventoried stream. Table 3-1 below illustrates some of the characteristics of a few of the watersheds in the Bohemia Mountain analysis area.

Table 3-1. Brief Descriptions of Some of the Bohemia Mountain Analysis Area Watersheds.

Watershed Name or Description	Area in Acres (sq. miles)	Total Stream Length (miles)	Drainage Density (mi./sq.mi.)
Duncan Salt Chuck Creek	23,008 (35.90)	74.50	2.08
Smallest Watershed	54 (0.08)	0.81	9.60
Largest Watershed	23,008 (35.90)	74.50	2.08
Smallest Drainage Density	129 (0.20)	0.24	1.20
Largest Drainage Density	54 (0.08)	0.81	9.60

These figures are determined from the Stikine Area channel type inventory and corresponding Geographic Information System (GIS) database, a computer mapping database. Drainage density is a measure of the total inventoried stream length in a basin divided by the basin area. Higher drainage densities indicate a watershed is more "dissected" than others, so there is higher risk that erosion processes will successfully deliver sediment to a stream channel. On the Stikine Area, drainage densities range from less than one to greater than 10 miles per square mile, with a median value of 2.8. The Bohemia watersheds have a median drainage density of 2.85 indicating that the Bohemia Mountain analysis area is typical of the Stikine Area.

The area receives a range of annual precipitation from 80 inches on the lowlands west of Bohemia Mountain to in excess of 120 inches on the top and south side of Bohemia Mountain. Most of the analysis area receives about 100 inches of precipitation per year. Approximately 63 percent falls between September and February. Runoff in the Duncan Creek watershed produces average annual discharges on the order of 5 to 8 cubic feet per second (cfs) per square mile. Two-year peak flows of 132 cfs per square mile may occur, usually associated with intense October storms, or early spring rain-on-snow events. Summer low flows of .58 cfs per square mile are possible, but are not considered potential impediments to fish passage and spawning success. Stream temperatures are expected to remain within anadromous fish limits year-round.

Channel Classification

Stream channels on the Tongass National Forest have been classified and mapped using channel types--a system which allows for comparing channels of similar form and function. A description of the physical characteristics and management considerations of the approximately 38 channel types is provided in *Channel Types Field Guide: A Guide to Stream Mapping Units on the Tongass National Forest Chatham Area* (R10-MB-6).

Channel types have further been grouped by the stream processes which formed them, reflecting the long term interaction of geology, landform, climate, and resultant vegetation patterns. These process groups explain the basic interrelationships between the runoff, sediment transport, and vegetation patterns of channels in order that management guidelines and practices developed for each process group would consistently address the various management concerns of the different types of channels.

For this level of timber sale project planning, process groups were further grouped according to two most basic management concerns. These include: 1) streambank stability--alluvial channels on floodplains and fans, and some portions of mixed-control channels; and 2) sideslope stability--V-notches of varying depth and other channels where streambank stream stability is less of a concern. For the management purposes considered here, a sideslope is the length of ground from the bankfull channel to the first major slope break above bankfull. The distribution of inventoried streams in the watershed analysis area is given in Table 3-2.

The majority of the inventoried streams are in well-contained bedrock channels (58 percent; see Table 3-2). These channels are managed for sideslope stability. Despite their bedrock nature, local areas of stream banks may be quite sensitive to disturbance. Being contained, most of these channels can route higher flood flows without overtopping their banks and easily transport silt, sand, and material the size of large cobbles.

On the east side of Portage Bay, these contained channels are steep but generally stable. They may, however, be adjoined by unstable side slopes with risk of failure.

On Bohemia Mountain, the majority of the inventoried streams contained channels with V-notches and steep, unstable side slopes. Many of them are actively eroding and have great amounts of large wood and logs which generally help provide for stability in the channels. Some of these logs, however, have created logjams which are presently causing great instability and erosion in specific segments of stream. The instability of the steep Bohemia Mountain channels is caused by the glacial till soils which are discussed in the Landform and Soils section (pages 3-7 and 4-x).

The upper reaches of mainstem Duncan Salt Chuck Creek are also contained and bedrock controlled, but have more moderate gradients than the unstable V-notches on Bohemia Mountain. Over time, the mainstem of the creek has cut its way through the glacial till to its present location in bedrock. Therefore, this segment of the mainstem also has naturally steep, unstable side slopes.

About 42 percent of the streams are alluvial, dependent on riparian vegetation and large, woody debris for stability, and sensitive to stream bank, stream bed, and floodplain disturbance (Table 3-2). These channels include portions of the lower mainstem of Duncan Salt Chuck Creek and lower valley tributaries, which would, in the event of timber management, be managed for streambank stability. Annual flows (a frequency of once per year) *may* go over stream banks onto floodplains, fans, and terraces, with the opportunity to both scour backwater or side channels and deposit sediment and nutrients. At higher flows these streams will easily move large gravels, as well as sand and silt particles.

Table 3-2. Distribution of Channel Type Process Groups on the Bohemia Mountain Analysis Area (all watersheds, inciuding those with ADF&G anadromous fish streams).

Managed For	Process Group	Stream Length (ml)
Streambank Stability	1. Low Gradient Floodplain[1]	33.9
	2. Alluvial Fan	4.0
	3. Mixed Control Moderate Gradient[2]	36.9
	7. Placid or Glide	20.8
	8. Estuary	7.5
	9. Beaver Ponds	1.6
		104.3
		= 42% of stream length
Sideslope Stability	4. Large Low Gradient Contained	15.0
	5. Moderate Gradient Contained	68.8
	6. High Gradient Contained[3]	57.5
		141.4
		= 58% of stream length

[1] **Low Gradient Floodplain** - These channels generally have a rich, abundant community of fish due to good spawning gravels and large wood for good rearing habitat.

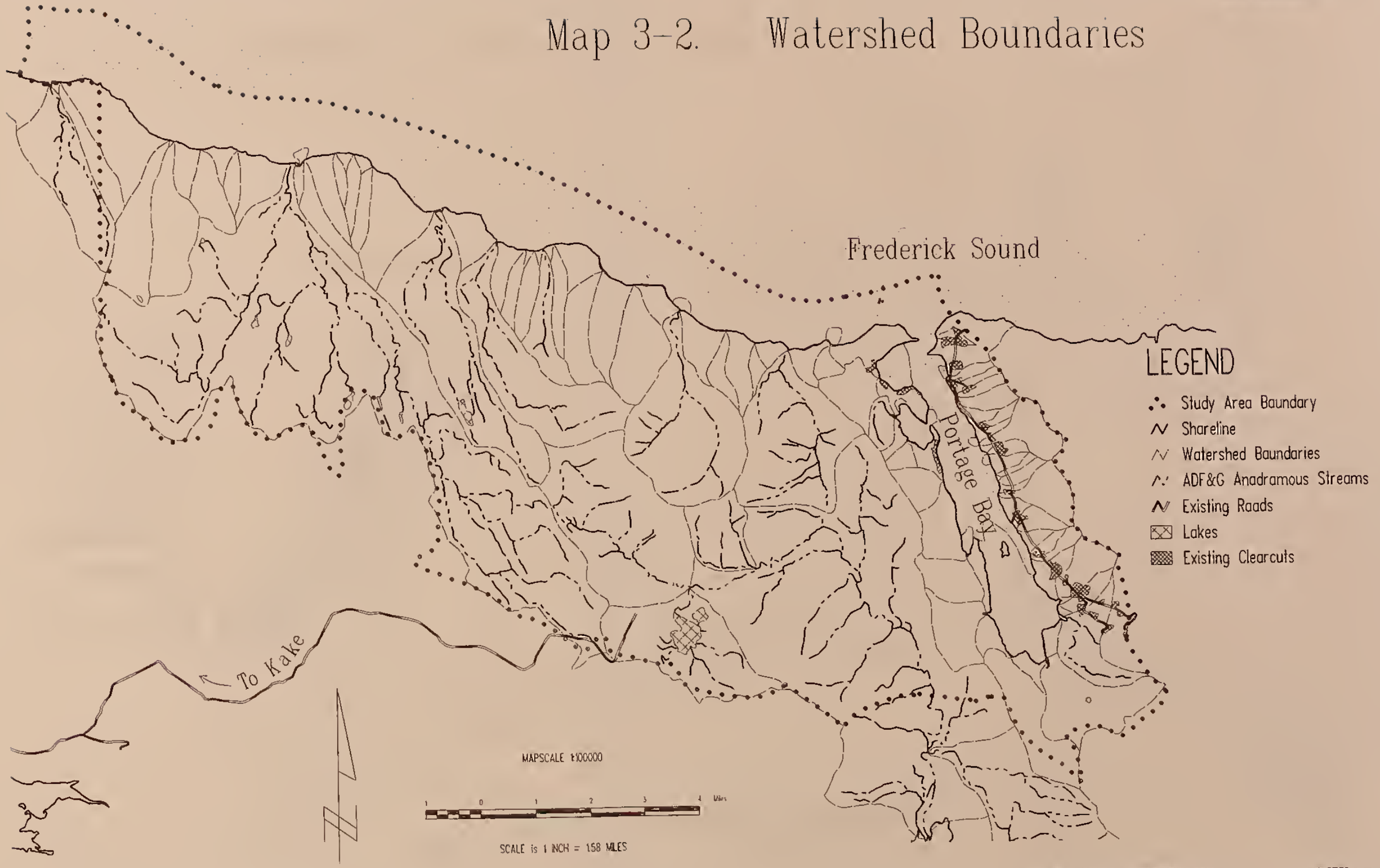
[2] **Mixed Control Moderate Gradient** - These channels provide excellent rearing habitat due to large wood accumulations in the streams.

[3] **High Gradient Contained** - These are the smaller, steep, bedrock channels either at high elevation or draining directly into salt water. Fish use of these streams or tributaries is very low.

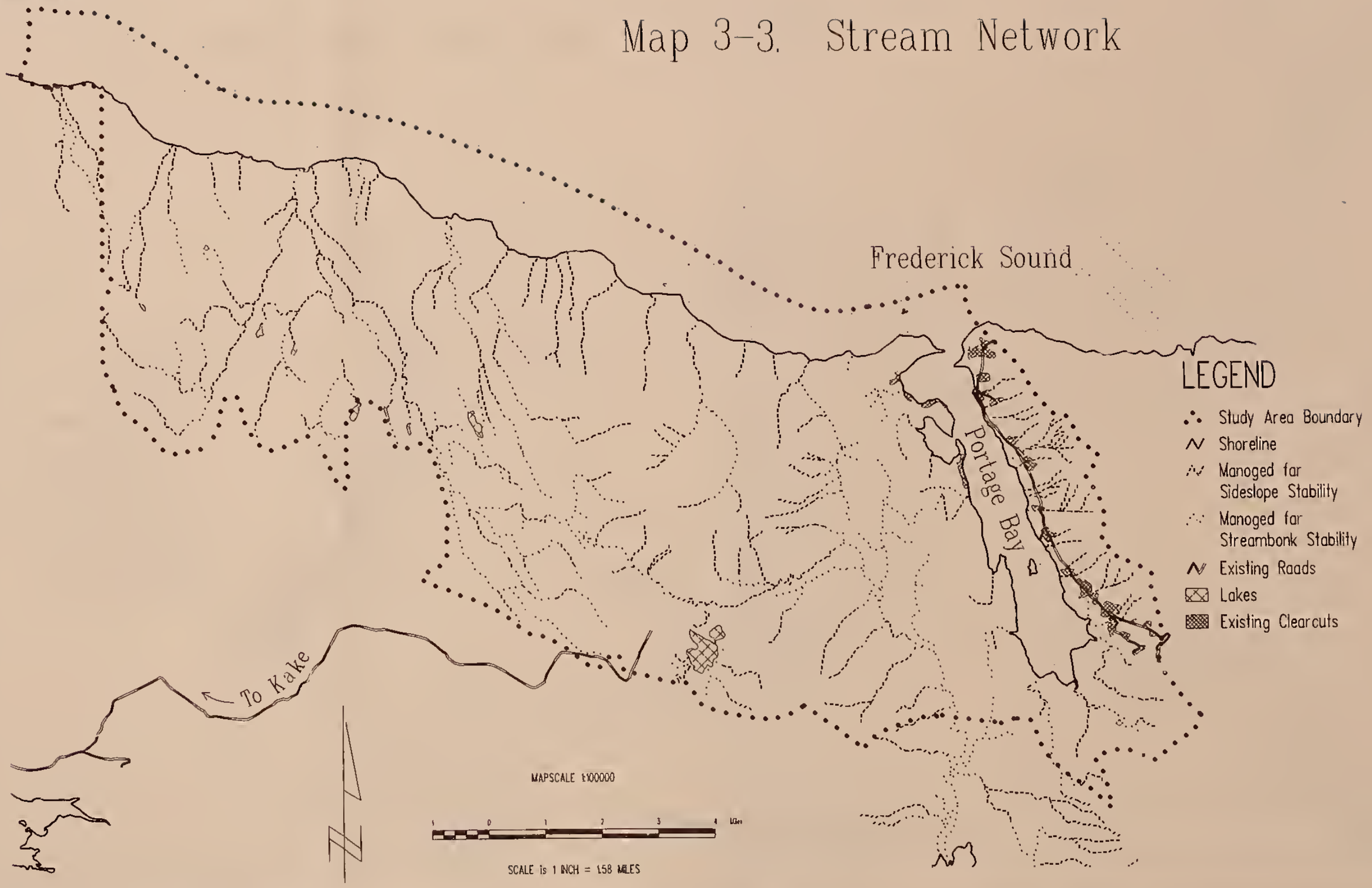
More detailed descriptions of the process groups can be found in Appendix A.

Map 3-2 shows the watershed boundary map for the Bohemia analysis area with only the ADF&G anadromous stream network. Map 3-3 shows the entire stream network grouped into two broad management concern classes, whether streambank stability, or stream sideslope stability.

Map 3-2. Watershed Boundaries



Map 3-3. Stream Network



Landform and Soils

The Bohemia Mountain analysis area, except the east Portage Bay portion, has the topography and geomorphology typical of the Kupreanof lowlands. It is strongly influenced by glaciers and has relatively low relief, consisting of few rounded hills, like Bohemia Mountain, protruding above the gently rolling lowland. The lowland soils are developed from thick deposits of glacial drift, which buried the pre-glacial landscape. The glacial drift is found on moderate slopes, from sea level to the top of Bohemia Mountain (2,300 feet). Marine terraces, below 400 to 500 feet elevation, such as the nearly level terrace between Frederick Sound and Bohemia Mountain and lowlands on each side of Duncan Salt Chuck Creek, are "glacio-marine" in origin, which is a glacial till deposited below sea level and commonly containing localized areas of layered materials left by water. Due to the instability of this material, road building, especially stream crossings, can be hazardous and mitigative measures are often expensive.

Steeper mountain slopes have mainly soils developed over bedrock, which are the most productive timber growing sites. They do present some management problems due to steep slopes and large, deeply incised, V-notched channels.

The area east of Portage Bay, the west slope of the Missionary Mountain Range, is unique from the rest of the analysis area. It is characterized by steep slopes and shallow soils developed in igneous bedrock. The lower concave slopes consist of deep soils developed from accumulation of materials at the foot of the slope.

Soil development in the Bohemia Mountain analysis area has been strongly influenced by high precipitation and cold soil temperatures, which leads to accumulation of organic matter. Tree rooting is generally very shallow, even on deep soils, occurring in the surface organic layers and the upper few inches of mineral soil. This rooting zone is typically very wet, acidic, and contains most of the nutrients available for plant growth.

Soil productivity and nutrient status can be influenced by timber management activities. Removing trees allows increased sunlight to penetrate and warm the soil, thus accelerating activity of microbes and making nutrients, especially nitrogen, more available to plants. Forbs, shrubs, and tree seedlings proliferate until the canopy closes and shades the soil surface.

Most nutrients are in the upper organic-rich layers, so when this layer is removed or disturbed, tree growth declines. This can occur by landslides, surface erosion, severe burning, yarding disturbance, or by displacement by roads, skid trails, landings, rock pits, or compaction and puddling, which impedes soil drainage and reduces productivity. Most undisturbed soils in the analysis area are protected by layers of organic matter and surface mats of vegetation, making them very resistant to surface erosion.

Recent research on landslides over the past 20 years in southeast Alaska (Swanston 1989) has concluded that over 90 percent of all landslides were not related to logging and road building. However, these activities do increase the potential for landslides. So, to minimize that danger, timber harvesting is usually excluded from particularly hazardous areas that have unstable soil types on steep slopes.

Vegetation, particularly tree roots, has a stabilizing effect on soils. Strength of tree roots tends to decrease significantly four to seven years after harvesting. This decrease in soil holding capability results in an increased likelihood of soil movement on steep slopes following clearcutting. Further, the displaced roots of uprooted trees can disturb the soil when windthrow occurs. Under natural conditions, windthrow is an important triggering device of debris avalanches and flows in southeast Alaska. A general stability analysis of the analysis area was done based on the Soil Resource Inventory of Kupreanof Island. The locations of hazardous soils are displayed in Map 3-4. Three classes, high, moderate, and low, rank soil units according to their relative potential for sliding (Table 3-3).

Table 3-3. Distribution of Soil Hazard Classes in the Bohemia Mountain analysis area.

Soil Erosion Hazard Class	Acres	Percent of analysis area
Low	54,953	81%
Moderate	9,511	14%
High	3,225	5%
Total	**67,689**	**100%**

Wetlands and Floodplains

Like much of southeast Alaska, the Bohemia Mountain analysis area contains a large proportion of wetlands. Approximately 70 percent of the analysis area is classified as wetland according to the soil resource inventory database (ref. 1) (see Map 3-5). These wetlands are comprised mainly of muskegs and forested wetlands as well as smaller amounts of estuarine, alpine meadows, and small lakes and ponds (see Table 3-4 and Map 3-5). Approximately 640 acres of floodplains have been identified, most of which are associated with Duncan Salt Chuck Creek or its tributaries.

Table 3-4. Distribution of Wetlands in the Bohemia Mountain Analysis Area.

Wetland Type	Acres	Percent of Area
Muskeg	16,171	24%
Freshwater Meadow	107	0%
Estuaries	41	0%
Forested Wetland	30,030	44%
Alpine Wetland	1,043	2%
Lakes and Ponds	244	0%
Total Wetlands	**47,616**	**70%**

Map 3-4. Hazard Soils

Frederick Sound

Portage Bay

To Kake

LEGEND

- Study Area Boundary
- Shoreline
- Major Streams
- Existing Roads
- Low Soil Hazard
- Moderate Soil Hazard
- High Soil Hazard

MAPSCALE 1:100000

0 1 2 3 4 Miles

SCALE is 1 INCH = 1.58 MILES

Map 3-5. Wetlands

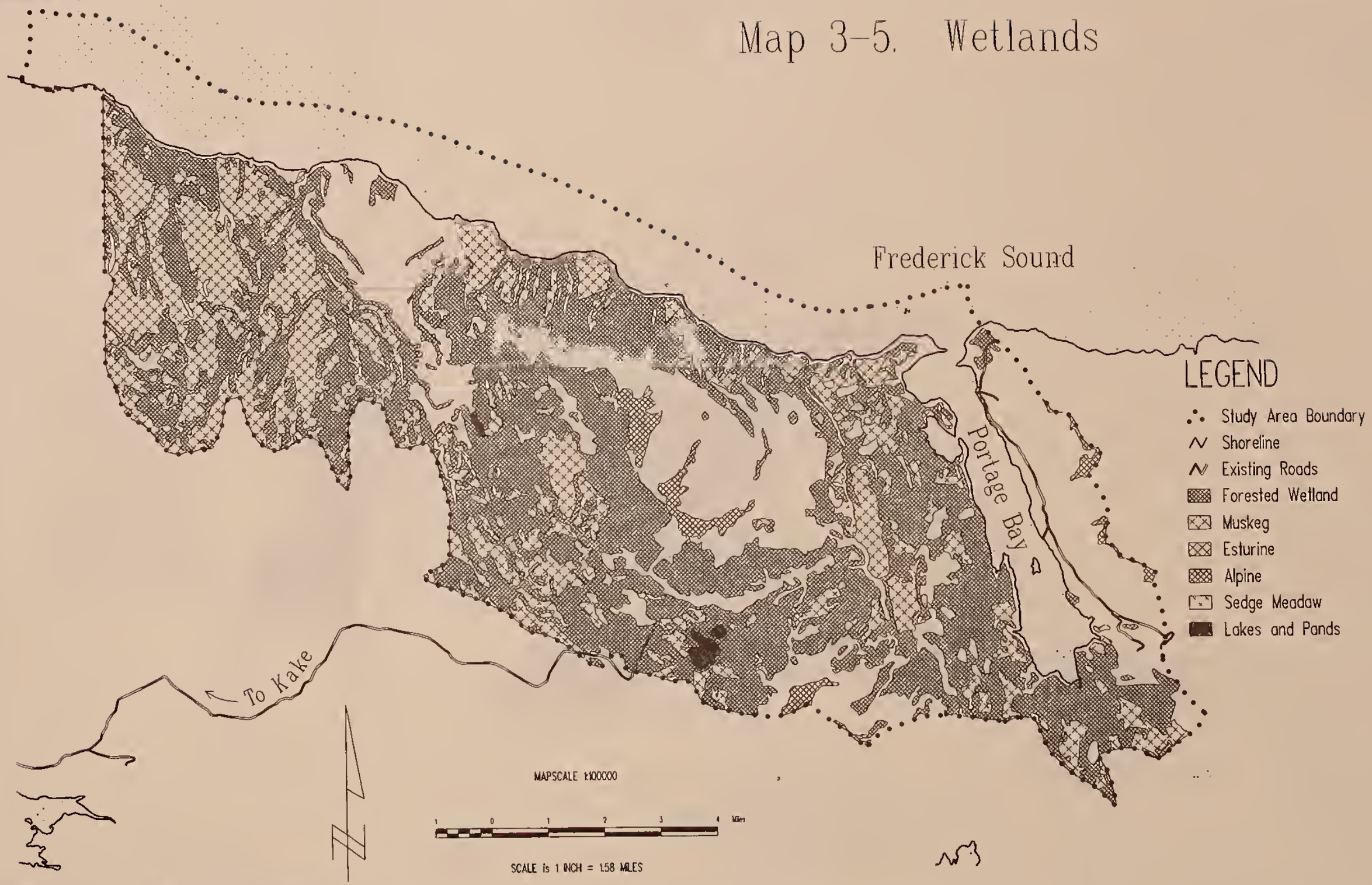
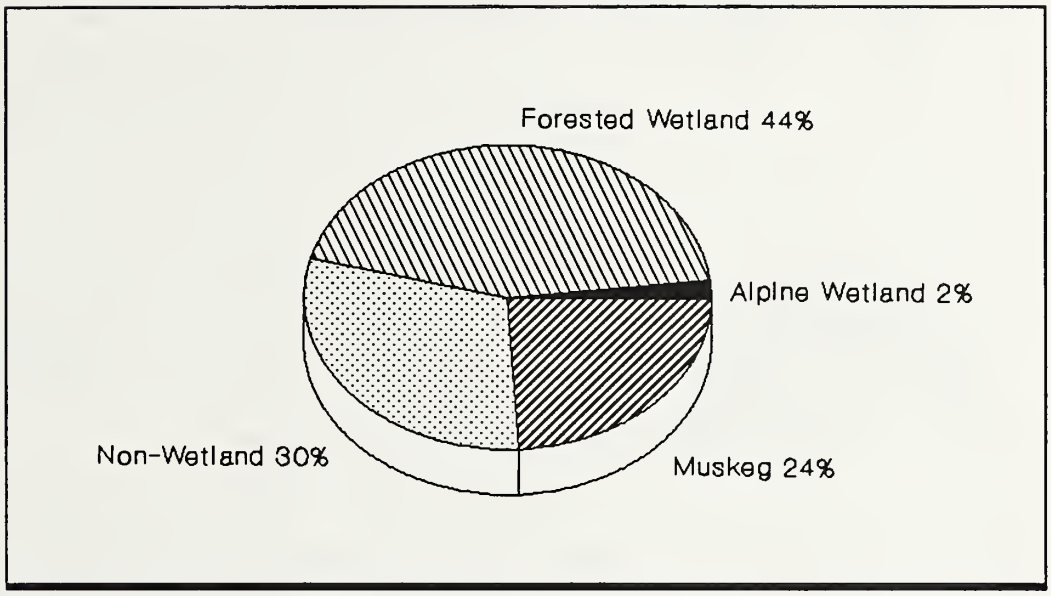


Figure 3-1. Proportion of Wetland Types.



Fish

Stream Classes

Within the Bohemia Mountain analysis area boundary, fisheries watersheds flow southerly into Duncan Canal and northerly and easterly into Frederick Sound and Portage Bay. The streams in the area are displayed in Map 3-6 as stream classes based on anadromous fish usage. The stream classes are defined as follows:

Class I: Streams with anadromous fish (ascending from oceans to spawn in fresh water) or adfluvial fish (ascending from fresh water lakes to spawn in streams.) Upstream lake and stream habitat could also be included if a structure allowed fish to pass over a migration barrier. High value resident sport fish populations are included in this class regardless of access.

Class II: Streams with resident fish populations and generally steep gradients are Class II streams. These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat feaures that preclude anadromous fish use.

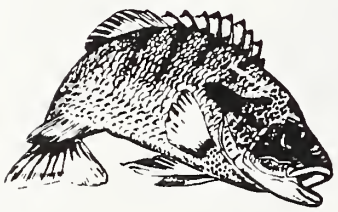
Class III: These are streams that have no fish populations but that could influence water quality in the downstream acquatic habitat.

Alaska Department of Fish & Game Numbered Streams

Duncan Salt Chuck Creek (ADF&G no. 106-43-059, Map 3-6 stream #10) is the largest stream in the analysis area. The lower 4.0 miles of stream are in the Petersburg Creek-Duncan Salt Chuck Wilderness. Stream surveys in recent years have shown 1,300 to 4,400 pink salmon spawning in the lower reach. The dark color of the water and deep canyon upstream create poor conditions for aerial survey. Field surveys indicated high numbers of coho and chum salmon in the upper reaches. A barrier in the upper 2.0 miles of stream on the main stem can possibly be eliminated to provide an increased potential annual coho production to a total of approximately 4,500 adults.

Portage Bay Creek (110-16-002, Map 3-6 stream #9). This creek has high salmon production although it is limited to the lower one mile of stream. Enhancement plans include fish ladder construction to access the upper productive habitat. Pink salmon counts range from 70 to 13,000. Chum salmon average 350 annually.

Numbered Streams (cont.)



Dry Cove Portage Bay (110-16-005, Map 3-6 stream #8). No signs of salmon. However, the potential exists for coho production.

1st stream west of West Point (110-16-006, Map 3-6 stream #7). Pink salmon escapement counts range from 150 to 2,300. Coho production is estimated at 650 annually. A spring has been located in the upper reach of the stream that may have potential for enhancement.

2nd stream west of West Point (110-16-007, Map 3-6 stream #6). Escapement counts for pink salmon range from 50 to 4,000 annually. Most of the salmon production occurs intertidally and upstream for about 1000 feet ending at barriers.

3rd stream east of Big Creek (110-16-008, Map 3-6, stream #5). Recent years indicate pink salmon escapement counts ranging from 100 to 200.

2nd stream east of Big Creek (110-16-009, Map 3-6 stream #4). Pink salmon counts over the years have ranged from 70 to 4,000. Juvenile Coho salman were also noted rearing in this stream.

1st stream east of Big Creek (110-16-010, Map 3-6, #3). Pink salmon escapement counts range from 125 to 2,500 over the years from 1971 to 1990.

Big Creek (110-16-11, Map 3-6 stream #2) is part of a large watershed. However, barriers exist on the main stem upstream of tidewater and on all main tributaries. Escapement counts for pink salmon range from 200 to 8,500. Additional road access to the area would reduce stream enhancement costs.

East Schooner Creek (110-16-012, Map 3-6 stream #1). 1st stream just west of analysis area. Barriers are present above tidewater on this small stream and only a few pink salmon were counted when surveyed.

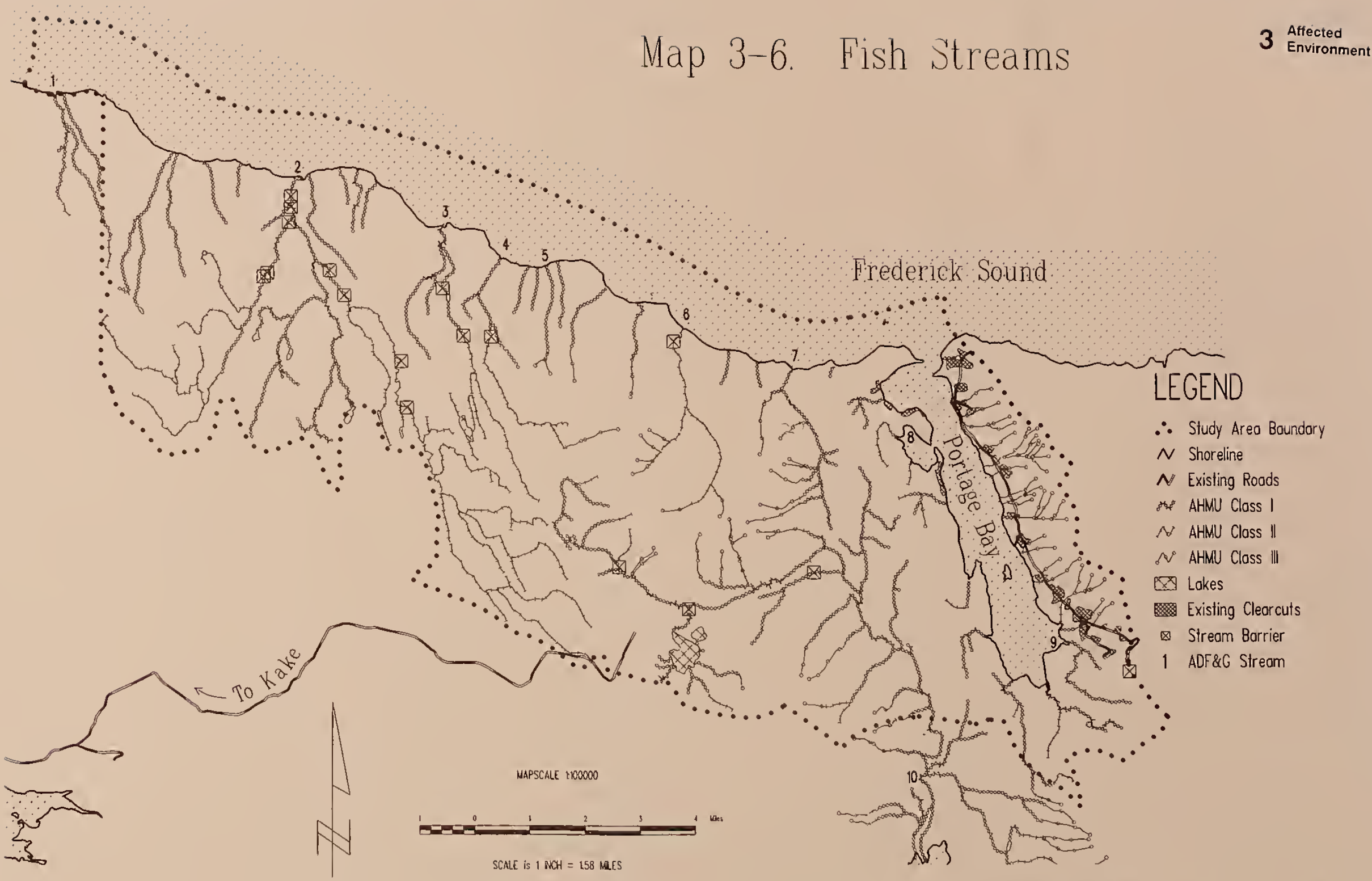
Wildlife Habitat Maintained

The current Tongass Land Mangement Plan specifies that a percentage of operable commercial land in each VCU will be maintained for wildlife habitat. Deferring a portion of the commercial forest land (CFL) within each VCU from harvest through the planned 100-year timber management rotation assures that habitat will be available for old-growth-dependent species throughout the planning period (for example, the life of the current Forest Plan is roughly 10 years).

The combined wildlife habitat acreage to be maintained for the three value comparison units (VCU) comprising the Bohemia Mountain analysis area totals 1,131 acres. This does not include the acreage allocated to Land Use Designation (LUD) II (VCU 441) which precludes normal timber harvest except for insect infestations.

A total of 9,131 acres of high value wildlife habitat were identified and mapped in the analysis area, using computer modeling and field surveys. These acres are referred to as high value wildlife habitat (see glossary) and include 3 habitats in order of importance for a diversity of wildlife species: estuary, beach fringe, and riparian.

Map 3-6. Fish Streams



Wildlife

The analysis area supports a large and diverse variety of resident and seasonal wildlife species including mammals, birds, reptiles and amphibians. More than 250 bird species occupy the area in the summer.

It is difficult to analyze habitat effects for each individual species. Therefore, the National Forest Management Act requires that management indicator species be identified for each national forest and be used for environmental analysis. The management indicator species were selected to reflect the diverse range of land types, plant communities, and special habitat requirements, as well as the equally diverse adaptability to changes in habitat, predation, hunting pressure, and other variables important to the well-being of wildlife. For purposes of this analysis, five species have been selected as indicator species for the area.

Species	Reason for Selection
• Sitka blacktail deer	Important game species, sport and subsistence
• Pine marten	Biodiversity (old growth), important furbearer
• Black bear	Game species, indicator of estuarine habitat
• River otter	Indicator of riparian habitat, furbearer
• Bald eagle	High public interest, old growth beach habitat

The first four are important indicators of the majority of the species within the area that are utilized for sport hunting, commercial trapping, and subsistence. Deer and particularly marten reflect old growth requirements critical to the needs of many other resident species including birds. Bald eagles are numerous and not considered threatened or endangered in Alaska, but because they are sensitive to forest management and protected by Federal Law, impacts on their nesting habitat must be analyzed. Nonconsumptive recreation such as wildlife viewing is fast becoming a significant pastime for both Alaskans and non-residents, and eagles are a favorite species. By far, the majority of this demand is along shorelines and beach fringe, which eagles use almost exclusively for nesting. Protection of bald eagle habitat will ensure the continuation of shoreline viewing for eagles and a variety of other mammals and birds that frequent this environment.

The capability of the analysis area to support the selected indicator species was analyzed with the help of computer habitat capability models developed for the Tongass Forest Plan Revision effort. These models generate habitat suitability indices that display the relative quality of habitat by species. It is important to note that the models do not reflect actual population estimates. Rather, they reflect potential numbers of the indicated species which the habitat is capable of supporting. The Habitat Suitability Index (HSI) generates a range of values from 0 to 1, with "0" having no value for the selected species, ".5" reflective of average habitat, and a maximum of "1" indicating optimum habitat. A value of 0.20 would indicate that the area is currently capable of supporting about 20 percent of the animals that the very best habitat could support.

Sitka Black-tailed Deer

The historical importance of deer winter range in portions of the Bohemia Mountain analysis area is well-documented. Deer browse transects located along the west shoreline of Portage Bay (sec. 34) estimate deer utilization of 45 percent of the *Vaccinium* (blueberry) twigs during the winters from 1961-62 to 1969-70. For reasons that are not fully understood, deer numbers drastically declined and have not recovered since severe winters in the early seventies. ADF&G records show less than one percent utilization along the same transects in 1979. In the winter of 1978-79, 24 deer were released in this area in an attempt to "jump start" deer recovery. Although deer numbers appear to be increasing slightly, they are still far below the high levels of the sixties and are not near modeled habitat capability.

Historically, black-tailed deer populations have been closely linked with winter severity (Merriam 1970) and predation mortality (Van Ballenberg and Hanley 1984). Even in the best winter habitat, deer die-offs are common. Predators normally inhibit the deer recovery, but not to the extent or length of time found in the area. There has not been a hunting season in this area since 1975.

The HSI model used for this analysis, assuming moderate snow levels and wolf predation, predicts the area is currently capable of supporting approximately 2,736 deer. For purposes of comparison an area of equal acreage of optimum habitat could support approximately 7,865 wintering deer.

Pine Marten

Marten are the most old-growth-dependent of the species being analyzed. Most cavity nesting or denning species will be represented by marten habitat requirements and consequently protected as long as adequate habitat for marten is maintained.

Historically, marten inhabited only the mainland of southeast Alaska. Only through cooperative transplant projects with the Alaska Department of Fish & Game (ADF&G) and the Forest Service are marten present on many islands.

Due to their high degree of metabolic activity, marten require proportionately more food than most other species (Worthen and Kilgore 1981). Their diet consists primarily of small mammals, birds, insects, and fruit. Snags provide important marten habitat, with the tops used as resting sites and cavities as denning sites in both summer and winter (Spencer 1987).

Marten are a valuable furbearing species. Continually fluctuating pelt prices normally determine the trapping pressure in an area. Portions of the Bohemia Mountain analysis area are excellent marten winter habitat, particularly Portage Bay and the Frederick Sound shoreline. Table 3-5 indicates the number of marten taken by trappers within the analysis area and the adjacent vicinity on Kupreanof Island over the last several years.

Table 3-5. Annual Harvest of Marten by ADF&G Harvest Units

	1984-85	1985-86	1986-87	1987-88	1988-89
Minor Harvest Area #2011 (includes more than analysis area)	13	33	16	82	N/A
Total for Mgmt. Unit 3*	272	155	110	357	N/A

*A portion of the area is non-National Forest land.

The HSI model for marten predicts the analysis area to be capable of supporting 131 animals under current conditions. Ongoing research conducted by the Alaska Department of Fish and Game on marten ecology in southeast Alaska is indicating that the animal's territorial requirements may be larger than the model assumes, since the model was based on research conducted primarily in the continental U.S. (Flynn personal communication).

Old-growth forests are unique ecosystems distinguished by old trees and related structural attributes, including tree size, accumulation of large woody material, number of canopy layers, and tree species composition. The old growth areas provide habitat necessary to ensure that viable population levels of old growth-dependent species are maintained and well distributed over time.

For the purposes of this analysis, old growth blocks were defined as a minimum 1,000 acres in size and comprised of volume class 4* or better timber. The minimum width dimension is ¼ mile. To be considered as single blocks, connecting corridors between patches must be a minimum of 500 feet wide. There are currently four blocks within the analysis area that meet the criteria defined above.

In the early 1970's, the Forest Service adopted a practice of staggered settings that results in a regular pattern of clearcuts and equal-sized leave strps between units. When viewed from the individual stand level, this harvest pattern maximized edge habitats to the benefit of many gamebirds and big game species, and creation of edge was, and remains, a game management habitat objective.

A recent broader perspective of wildlife ecology has recognized that a group or guild of wildlife prefers forest interior conditions not affected by openings or abrupt ecotone edges created by forest management. Recent research has demonstrated that edge effects may extend up to 2 to 3 tree heights into the forest stand. Area-sensitive species are the neotropical migrant forest-nesting songbirds.

When viewed at a larger scale of aggregation of stands within an entire watershed, staggered setting harvest techniques have fragmented many forest landscapes, thus minimizing the availability of forest interior habitats. Simulation studies have demonstrated that when as little as 50 percent of the forest in a watershed has been harvested under the staggered setting regime, little if any forest interior habitat conditions remain. This management system could have negative consequences to maintenance of biodiversity.

On the Tongass National Forest, several Management Indicator Species proposed for the Revision of the Tongass Land Management Plan may be sensitive to forest effectiveness. In addition, several species that occur on the Tongass National Forest were found in a northern California study to be either sensitive to fragmentation (for example, sharp-shinned hawk and blue grouse) or were rarely detected along edge habitat (for example, brown creeper, golden-crowned kinglet, and Townsend's warbler).

In addition to the potential for abrupt edge to reduce wildlife habitat suitability, there are other negative consequences of harsh edge. The zone of edge influence that can extent 2 to 3 tree heights into the forest stand has the potential to disrupt old-growth functional processes through modifications in wind, temperature, humidity, and light regimes naturally occurring in relatively stable old-growth systems. Finally, edge created by clearcutting harvest systems exposes a forest stand to increased susceptibility to windthrow in high risk landscape positions.

Another important habitat component of forest blocks are snags for cavity nesting birds and mammals. Snags are defined as dead trees at least 15 inches in diameter at breast height and ten feet in height or taller. It is estimated that the hairy woodpecker requires an average of 672 snags per 100 acres to achieve maximum populations in southeast Alaska. The less dependent red sapsucker requires approximately 160 snags per 100 acres.

Stand data for the analysis area estimate there are currently greater than 2,000 snags per 100 acres of forested habitat (lands capable of supporting 10 percent tree cover).

Black Bear

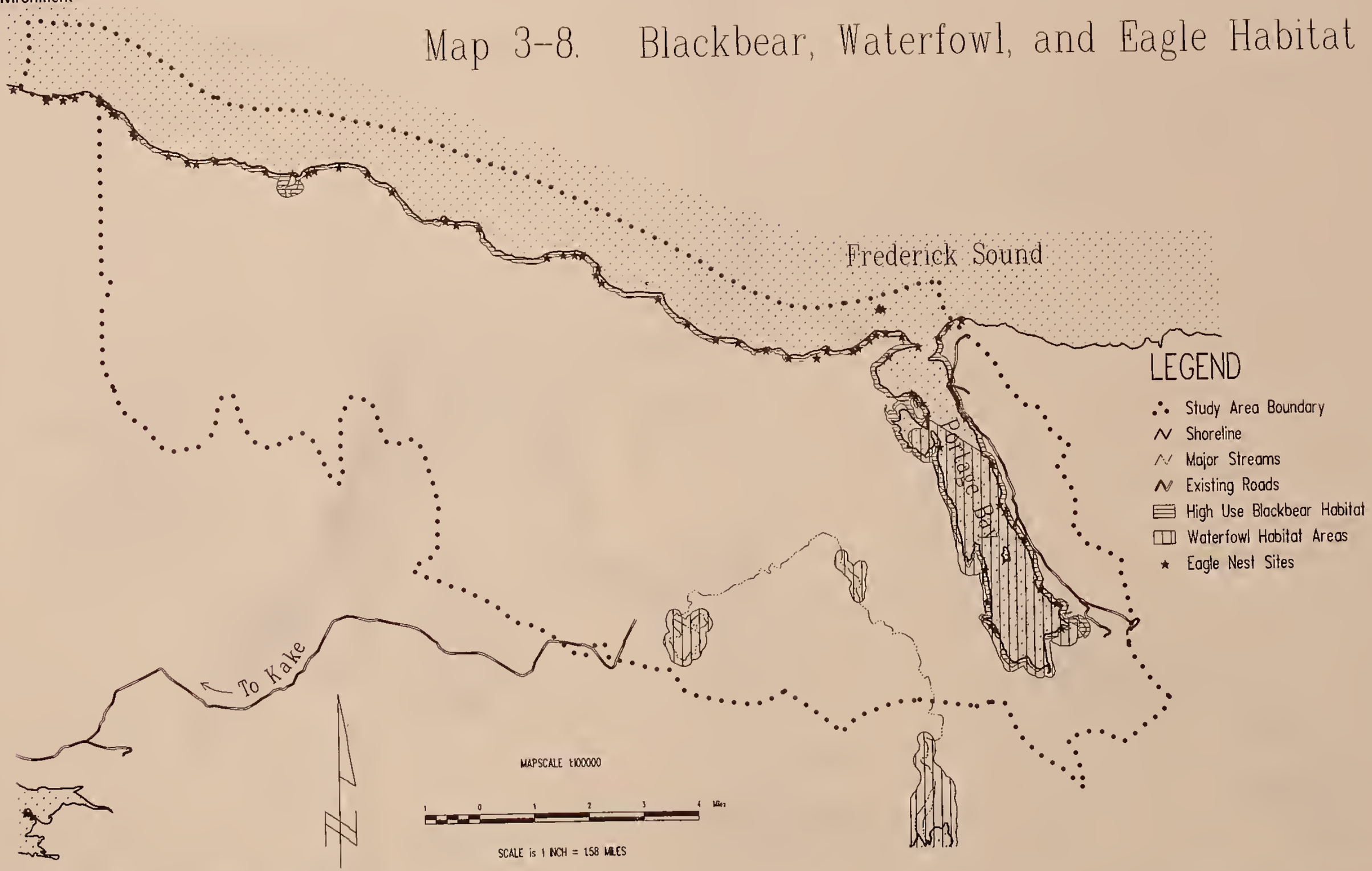
The analysis area currently supports a high black bear population. Aerial and ground surveys conducted in 1989-90 show high densities of black bear over most of the area. Although black bear are omnivorous and will utilize and forage in all available habitat, this use is seasonally concentrated in salmon areas and in areas of early season forage. Riparian, beach fringe, estuarine, and lake shores are all preferred habitat (see Map 3-8).

Cover and available denning sites are important factors when rating black bear habitat as desirable. Research conducted on Mitkof Island by Erickson in 1982 highlighted the importance of maintaining denning sites in managed areas.

Black bear are hunted both for sport and subsistence. The Portage Bay shoreline is particularly popular for bear hunting. Harvest data for an eight-year period, 1980-87, range from a high of 36 bear taken in 1985, to a low of nine in 1980, with an average of 21. These harvest figures represent legally taken bear for the whole analysis area that were reported to the Alaska Department of Wildlife Conservation. Actual figures are likely to be higher because not all bears killed are reported.

Map 3-7. Deer Winter Range

Map 3-8. Blackbear, Waterfowl, and Eagle Habitat



River Otter

River otter generally use uplands close to the beach (Larsen 1983) where habitat is described as beach fringe. Field surveys in the analysis area during the summer of 1990 noted otter a considerable way inland, particularly along Duncan Salt Chuck Creek (Daniels, personal communication).

Most riparian furbearers, otter included, are dependent on large organic debris and trees along beaches and streams. The large root "wads" and down tree trunks create undercuts and hollows that provide den sites and cover and concentrate prey species.

River otter are trapped for their fur in southeast Alaska. Access in the analysis area is limited due to a lack of roads and difficult boating during the trapping season. Table 3-6 displays harvest figures for river otter taken within the analysis area.

Table 3-6. Annual Harvest of River Otter by ADF&G Harvest Units.

	1984-85	1985-86	1986-87	1987-88	1988-89
Bohemia Mtn. analysis area	0	3	3	N/A	N/A
Total for Game Mgmt. Unit 3*	141	51	45	N/A	49

*A portion of the area is non-National Forest land.

Bald Eagle

The analysis area shoreline provides excellent bald eagle nesting habitat as shown by the number of surveyed nests. Bald eagles in southeast Alaska nest almost exclusively within 500 feet of the beach in large, old growth trees.

Concerns over impacts associated with development near eagle nests resulted in the establishment of a Memorandum of Understanding (MOU) between the Forest Service and the U.S. Fish and Wildlife Service in 1984. One of the key elements of this agreement is the requirement to provide a 330-foot "buffer strip" around identified eagle nests. Population estimates based on aerial surveys show an increase from about 7,000 eagles in the early 1970s to over 12,000 in 1987 throughout southeast Alaska.

Other Species of Interest

Waterfowl

Several bays and estuaries provide excellent habitat for resident and migrating waterfowl. Most notable are Portage Bay, especially the area south of Stop Island and Dry Cove; the Frederick Sound shoreline, and several small inland lakes and ponds. Portage Bay supports the most waterfowl hunting within the analysis area (Map 3-8).

Blue Grouse

Blue grouse are widely dispersed throughout the area. Field surveys conducted in the spring of 1989 showed high densities of male territories located over a wide range of habitat types and elevations. Because of poor access, there is little hunting pressure in the area.

Non-Game Birds

Important shorebird habitat locations within the analysis area are the estuarine flats at the head of Portage Bay, the Frederick Sound shoreline, Bohemia Lake, Goose Marsh, and several beaver-dammed riparian areas. Portage Bay and offshore waters are used by guillemots, murres, marbled murrelets, several gull species, and various other seasonal migrants. Arctic terns use the southern tip of Stop Island for nesting habitat.

The inland forested and mixed muskeg habitats are occupied by most, if not all, resident Stikine Area bird species. The area also provides important resting and feeding habitat for spring and fall migrants.

Moose

Moose are present in low numbers throughout the area. Historically, moose have never been numerous, which is attributed to the lack of high-quality winter browse species such as willow, red osier dogwood, cottonwood, and mountain ash. Wintering sign was noted at Bohemia Lake and Portage Bay during field surveys.

Threatened, Endangered and Sensitive Species

The humpback whale and northern (Stellar) sea lion are the only listed species known to occur in the vicinity of the analysis area.

The endangered humpback whales are frequently observed off the Frederick Sound shoreline. No important feeding or travel ways are within the analysis area.

Northern sea lions were listed as a threatened species by the U.S. Fish and Wildlife Service in June of 1990. There is no important sea lion habitat within the area proposed for management.

The following eight species have been classified as sensitive on the Tongass National Forest: osprey, Peal's peregrine falcon, trumpeter swans, dusky Canada geese, Montague Island vole, Fish Creek chum salmon, King River salmon, and Wheeler Creek king salmon.

There are no records of sensitive species occurring within the analysis area.

Special Emphasis Species

The northern goshawk and marbeled murrelet are species that are not formally listed as threatened, endangered, or sensitive but because of poor information on management implications they require special consideration. Both species require old growth habitat. The murrelet is currently being proposed as threatened in the continental United States and possibly in Alaska. Preliminary models and guidelines are available to help display habitat requirements and analyze management effects. The goshawk was designated as a management indicator species in the 1990 Resources Planning Act. It was proposed but not selected as a management indicator species in southeast Alaska due to lack of basic ecological data.

Subsistence

With the passage of the Alaska National Interest Lands Conservation Act (ANILCA) in 1980, Congress formally recognized the importance of subsistence resources to rural communities in Alaska. ANILCA defines subsistence as:

The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal and family consumption; and for customary trade (ANILCA, 16 USC 3113).

No prior evaluations, as mandated by ANILCA, have been done for the Kupreanof Island area. However, the courts have ruled that the Forest Service must consider cumulative impacts of past, present, and reasonably forseeable activities when conducting subsistence analyses. See Chapter 4, Subsistence section for a discussion of these potential impacts.

Mean income is an indicator of the importance of subsistence to individual communities. Ideally, households with higher incomes would be able to supply more of their needs through the cash economy. However, higher incomes do not necessarily indicate a lesser dependence on subsistence resources. One example is the sharing of harvested subsistence resources by higher income households. These resources are shared with friends, family, neighbors, and those unable to harvest their own.

Subsistence harvesting of resources plays a key cultural role in rural communities. Even if individual households could purchase all their subsistence needs through the cash economy, the socio-cultural and socio-economic processes of procuring, gathering, and sharing subsistence resources is an important cultural aspect of southeast Alaska. Traditional foods sought for subsistence may not be available through any other means. Occasions for procuring subsistence resources are often incorporated in community and household social events. Historical use patterns, such as the annual cycle of small family groups moving to summer fishing camps, then to larger winter villages where a number of family groups reside, are linked to the traditional subsistence harvests.

Subsistence Communities

Communities using the Bohemia Mountain analysis area for subsistence include Kake, Petersburg, and Wrangell. A limited background on individual community history, population, economy, and subsistence uses for each community follows.

Kake

The town of Kake is situated along the northwestern shore of Kupreanof Island and is predominantly inhabited by Alaska Natives. The earliest occupation and exploitation of subsistence resources by the Kake Tlingit predates historical records. The Kake people have traditionally used the area between Kake and Portage Bay. Based on the results from the Tongass Resource Use Cooperative Survey (TRUCS), Kake used the analysis area for hunting, fishing, and gathering of subsistence resources. (See maps in Appendix D).

Logging on the private and public lands near Kake has resulted in an extensive road system which residents use to gain access to areas for hunting, fishing, and gathering.

In 1985, Kake's population was calculated to be almost 70 percent Alaska Native. Major sources of income include fishing and fish processing (28 percent), timber harvesting (18 percent), longshore working (13 percent), working in schools (8 percent), and in government (1 percent). Employment within the community is highly seasonal, with more than 50 percent unemployment reported during a 1985 social survey. In a more recent survey, there appear to be two distinct groups based on income: one group of incomes is in the $5,000 - $10,000/year range and the second group is in the $30,000 - $40,000 range. The second group probably represents those residents who were seasonally employed at the Kake Tribal Logging Company (Firman and Bosworth 1990:51).

Petersburg

Petersburg is located on the north end of Mitkof Island, at the northern end of the Wrangell Narrows. Most employment is in the fishing, fish processing, tourism and logging industries, and in government services.

In 1987, the community's population was estimated to be approximately 3,282 residents (Smythe 1988). Of this total, approximately 13 percent were believed to be Alaska Natives (ADF&G 1989). Mean per person income in 1987, was recorded at $12,602 (Kruse and Frazier 1988). Employment sources are dominated by seafood procurement and processing (36 percent), government (28 percent), retail sales (13 percent), and construction (9 percent). Many of these activities are seasonal in nature.

Wrangell

The community of Wrangell is located in the east-central portion of southeast Alaska, on the northern point of Wrangell Island, about seven miles west of the Stikine River.

The Wrangell Forest Products sawmill is the town's largest employer and tourism is an emerging industry.

A 1985 population estimate of 2,836 residents included roughly 40 percent Alaska Natives. Mean per-person income for the community in 1987 was about $11,989 (Kruse and Frazier 1988). Major sources of employment are within the following areas: government (25 percent), retail sales (19 percent), manufacturing (16 percent), and fishing and fish processing (13 percent). Employment in the tourism, retail sales, and fishing sectors of the economy are primarily seasonal.

Subsistence Use

Kake

Kake residents rely heavily on deer, bear, seals, grouse, waterfowl, fish, trapping of furbearers, and gathering of shellfish, seaweed, and berries. The average annual harvest of subsistence resources was reported to be about 160 pounds per person in 1987. This figure is further refined to reflect the use of deer (24 percent), salmon (22 percent), and other finfish (21 percent). Subsistence provides about 20 percent of the community household needs.

Petersburg
Minimally, residents of Petersburg use deer, bear, moose, salmon, halibut, other finfish, waterfowl, clams, crabs, and berries. Annual harvest of subsistence resources averaged about 203 pounds per person in 1987. Emphasis appears to focus on salmon (23 percent), other finfish (22 percent), and deer (22 percent). Subsistence resources provide roughly 30 percent of the household food supply.

Wrangell
Deer, moose, bear, waterfowl, salmon, halibut, other finfish, shellfish, and berries are harvested by Wrangell residents. Annual harvest of subsistence resources was estimated to be about 165 pounds per person in 1987. This total was subdivided into the following breakdown: shellfish (25 percent), salmon (18 percent), and other finfish (26 percent). Subsistence resources provide about 23 percent of the household needs for Wrangell residents.

Use of Bohemia Mountain Analysis Area

The Bohemia Mountain analysis area includes three Value Comparison Units (VCU's): 424, 441, and 442. Kake, Petersburg, and Wrangell have documented use within the analysis area.

Deer hunting has played an important part in the subsistence lifestyles of these communities. A dramatic deer population decline took place throughout much of south-central and southeast Alaska during the late 1960's and again in 1975, when the Alaska Board of Game closed all of Mitkof, Kupreanof, and Kuiu Islands to all deer hunting. These islands currently remain closed to sport and subsistence harvest, although there will probably be a deer hunting season on Mitkof Island in 1991.

Information derived from the Tongass Resource Use Cooperative Survey (TRUCS), as displayed in the Draft Tongass Land Management Plan Revision, documents subsistence uses for the following categories in the analysis area: Most Reliable Deer Hunting Areas, Most Often Used Deer Hunting Areas, and Salmon and Invertebrate Harvest Areas. Utilization by community and VCU follow: VCU 424--Kake, Petersburg, and Wrangell; VCU 441--Petersburg and Wrangell; and VCU 442--Petersburg and Wrangell. Traditional means of access to the analysis area has been by boat and by foot. Access by residents from Petersburg and Wrangell was almost always by these two methods. A road corridor from Kake (forest road 6930) allows access to a small segment of the southern portion of the analysis area. Vehicles using this road come predominantly from Kake.

Hunting and Trapping

Wildlife in the analysis area is managed by the Alaska Department of Fish and Game (ADFG). Hunting is allowed during open seasons for black bear, but the season for Sitka blacktail deer has been closed since 1975. The average hunter take of black bear in the Portage Bay area for both sport and subsistence use has been 21 bears annually.

The trapping of furbearers, mostly mink, marten, and wolf, occurs along the saltwater beach fringe and along the creeks. State hunting and trapping records indicate that an average of 10 marten are taken from the analysis area each year for commercial purposes.

Recreation

Three concepts are used to describe recreation: (1) the **Recreation Opportunity Spectrum (ROS)** was used to inventory and measure changes to the overall recreation setting, (2) **recreation places** refers to both known and potential recreation areas, and to areas where concentrated use outside of developed areas occurs and (3) **existing use and potential demand** is to be used to forecast changes resulting from management actions.

ROS

ROS is a conceptual tool to describe opportunities for activities by looking at the settings that provide these opportunities. Settings range from urban to primitive. Seven classes are considered for inventory and descriptive purposes; five of these are contained in the Bohemia Mountain analysis area.

The analysis area is mainly in a "primitive" setting. This covers an area west of Portage Bay, over Bohemia Mountain, and extending into the vast muskeg flats on the west side of the analysis area. As one moves away from this core, a transition into "semi-primitive nonmotorized", then "semi-primitive motorized" setting is encountered, with "semi-primitive motorized" constituting the shoreline against Frederick Sound and the west side of Portage Bay. Forest Development Road 6030 from Kake provides a "roaded natural" setting. Since roads, harvest units, and developments exist, the east side of Portage Bay is inventoried "roaded modified."

Table 3-7.A Summary of ROS Settings in the Bohemia Mountain Analysis Area.

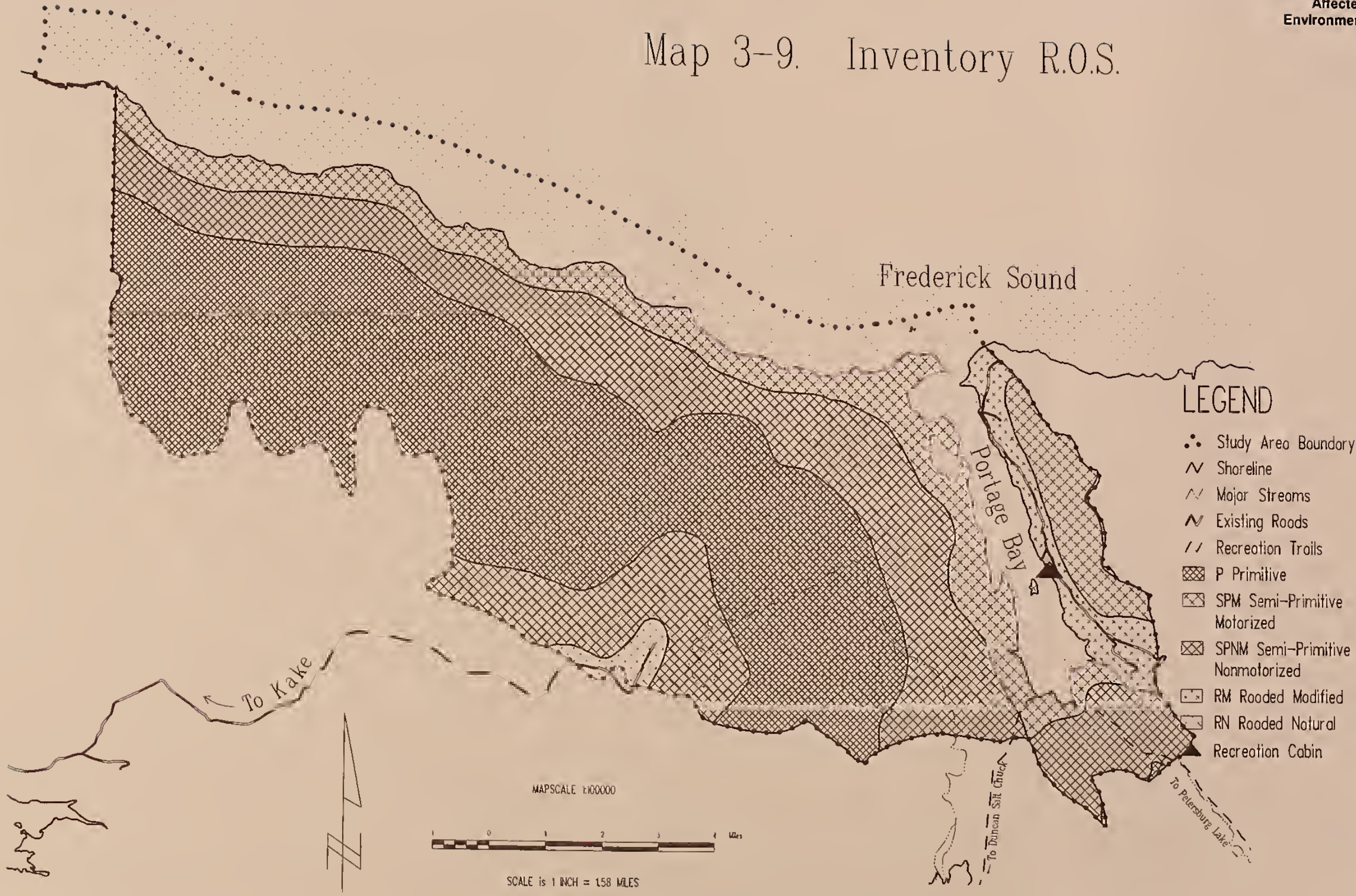
Classification	Acres
Primitive (P)	32,604
Semi-Primitive Nonmotorized (SPNM)	21,656
Semi-Primitive Motorized (SPM)	10,346
Roaded Natural (RN)	681
Roaded Modified (RM)	2,402
Total	67,689

Recreation Places

Recreation places were developed and used for the forest plan revision process. Besides inventorying existing sites and those that could be developed, it provides a process for identifying and inventorying important dispersed areas. An attractor like fishing, beachcombing, solitude, remoteness, or a combination of these attractors could exist in undeveloped areas and attract recreationists.

Recreation places outside of the analysis area can be affected by activities within the analysis area, depending on the attributes of the attractor. For instance, if sights and sounds in the analysis area affect the adjacent Wilderness, the qualities and attributes which attract recreationists to those recreation places, such as solitude and remoteness, could change, possibly resulting in different activities, social conditions, and users. Likewise, drastic setting changes may have little impact on the attractor of a place. For instance, a good fishing spot may attract use, whether it be in a developed setting or a natural setting.

Map 3-9. Inventory R.O.S.



Recreation Places (continued)

Nine recreation places are located either partially or totally in the analysis area. Two of these comprise the area at the end of the 6030 road. One consists of activities facilitated by road access, such as driving and gathering forest products, and the other is associated with informal hiking and use of Bohemia Lake. The northwest corner of the analysis area adjacent to Frederick Sound contains one place used for stream fishing and dispersed camping.

The majority of recreation places exist in the Portage Bay vicinity. Two of these just inside of the entrance to the bay provide anchorages and boating opportunities. Two at the south end of the bay provide hunting and hiking. One of these includes overnight opportunities at the Portage Bay cabin. Two recreation places just beyond the bay area provide the continuation of hiking opportunities into the Wilderness, via the Portage Mountain loop trail, with options to Petersburg Lake or to the head of Duncan Salt Chuck.

Table 3-8. A summary of recreation places in the Bohemia Mountain analysis area.

Recreation Site	ROS*	Recreation Opportunities
Frederick Sound	SPM	Stream fishing, dispersed camping
6030 Road End	RN	Hiking, road travel, gathering forest products, potential trailheads for Bohemia Lake.
Bohemia Lake	SPNM	Hiking, picnicing, potential trails and developments such as picnic tables, shelters.
NW Portage Bay	SPM	Boat use, two anchorages, recreation residence.
NE Portage Bay	RM	Boat use, two anchorages, boat dock at LTF.
SE Portage Bay	RM	Hunting waterfowl and bear, Portage Bay cabin.
SO/SW Portage Bay	SPM	Hunting waterfowl and bear, hiking and two trailheads.
SW of Portage Bay	SPNM	Hiking (Petersburg Creek-Duncan Salt Chuck (PCDSC) Wilderness, Duncan Canal access), viewing scenery.
SE of Portage Bay	SPNM	Hiking (PCDSC Wilderness, Petersburg Lake access)

*(P)Primitive; (SPNM)Semi-Primitive Nonmotorized; (SPM)Semi-Primitive Motorized; (RN)Roaded Natural; (RM)Roaded Modified

Recreation Places (continued)

Primary developed sites in the area are the Portage Bay cabin and the Portage Mountain loop trail. The cabin, originally constructed as an administrative site, sleeps six and is equipped with an oil stove. It is identified in the Petersburg Recreation Plan and Regional Capital Investment program for replacement and relocation. This move is due to its nonstandard design, age and condition, limited access dependent on high tide, and fair weather anchorage. The new location would likely be in Portage Bay. It is currently in a "roaded modified" ROS setting.

The Portage Mountain loop trail, #535, has two distinct segments. Segment one extends from Petersburg Lake to Portage Bay, a distance of about 5 ¼ miles, of which about 3 ¼ are in the Wilderness. Segment two goes from Portage Bay to the Duncan Salt Chuck at the head of Duncan Canal, where it ties in with the Salt Chuck East public recreation cabin. This distance is about 4 ¼ miles, of which about 3 ¼ are in the Wilderness. About one mile of this trail is a beach area in Portage Bay which ties the two segments together, for a total trail length of about 10 ½ miles. All of this trail is within the primitive and semi-primitive ROS classes (P, SPNM, SPM). Both trail segments are maintained in a primitive condition, which generally involves periodic brushing and blazing of the route.

Extended loop hiking activities could be provided if this trail were to be extended easterly from the Salt Chuck East cabin. Few of these lengthy hikes exist in the region. Two main options exist: (1) tie back into Petersburg Lake, keeping the extension within Wilderness and (2) continue up Duncan Creek to Wrangell Narrows. About a third of this extension would be in Wilderness, another third in LUD IV land allocation, and the final third in state land along Coho Creek. Other options and side trips are possible and could provide extended hiking opportunities and tie in with existing cabins.

The Petersburg Creek-Duncan Salt Chuck Wilderness is not within the analysis area, but may show the effects of activities occurring there. A complete description of the Wilderness can be found in the "Analysis of the Management Situation" for the Tongass Land Management Plan Revision. This 46,777-acre wilderness was established in 1980, under ANILCA.

Activities present include fishing, hunting, hiking, boating, nature study and camping. The area provides good opportunities for solitude and primitive recreation, and a high degree of natural integrity and apparent naturalness. Few issues, other than aircraft overflights through the valley, have surfaced in previous public scoping efforts or recent internal surveys. Fish enhancement projects and increased use from the east side are potential issues.

Use and Demand

There is no road access for many of these recreation places, and thus boat access becomes an important factor. Gaining boat access involves considerations about distance from population centers, boat size, and exposure and openness of a body of water. Portage Bay is one of few protected waters off Frederick Sound and is important from a recreation and boater safety perspective.

Generally, recreation use in the analysis area is considered relatively light. Road 6030 provides access from Kake, which is served by the Alaska Marine Highway. The north portion of the analysis area is accessible by boat from Frederick Sound. Portage Bay does provide protected waters and access, although the south end of the bay is only accessible under certain high tide conditions. Trails from the wilderness provide walking access to the southern portion of the area.

Road 6030 from Kake receives light traffic, and field personnel observed a minor increase in public use around the Bohemia Lake area. Bohemia Lake has several gravelly beaches, a unique feature not found in the lakes closer to Kake. During the development of the Petersburg District Recreation Plan, several comments were made concerning use and potential opportunities of this area. However, other opportunities closer to the community were a higher priority. The community of Kake is currently looking at options for economic diversity. These include guide and outfitting businesses along with other types of tourism, which could result in increasing demand for recreation opportunities in the Bohemia Analysis Area.

The Portage Bay area receives relatively moderate recreation use due to its proximity to Petersburg and the protection it provides. Motorcyclists, bikers, ATV users, and hikers all use the road system. Use of the Portage Bay cabin ranged from 18 to 24 nights per season over the past few years and occurs in the spring, summer, and fall.

Portage Mountain trail is lightly used within the analysis area with slight day-use increase around cabin areas. Use of the entire trail in one outing is estimated to be between zero and 20 per season.

The City of Kupreanof has expressed interest in these trails. They believe the trails could provide extended hiking opportunities that would encourage such cottage industries as bed and breakfast inns, outfitting and guiding services, backpacking organizations, and transportation services. They believe expansion of the trail system could be an important factor in drawing visitors to their area, though, at this point, no known plans exist to provide these services. Further development of the trail opportunities in this area was not identified in the recent Petersburg Recreation Plan. However, general statements on the need for extended hiking opportunities and for better trail maintenance in the area were mentioned by the public several times. These public suggestions are consistent with general Forest Service policy and draft forest plan direction, which emphasizes loops, proximity to communities, and extended opportunities.

Wild and Scenic Rivers

Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act requires that all federal land management agencies identify rivers with outstandingly remarkable values and decide which will be recommended to Congress for designation as Wild and Scenic Rivers. Designation is a four step process: (1) the agency identifies streams or stream segments with outstandingly remarkable values; (2) the agency classifies each eligible stream into one of three categories, wild, scenic, or recreational; (3) the agency evaluates the effects of designating each eligible river and selects the rivers that are suitable for recommendation to Congress; and (4) Congress designates rivers for inclusion in the National Wild and Scenic River System.

Tongass Forest Plan Revision

During the Spring of 1990, the Forest Service identified 112 rivers on the Tongass as tentatively eligible for designation as either wild, scenic, or recreational classification. The eligible rivers will be examined for suitability in the Forest Plan Revision process currently underway. Each Revision alternative includes a different mix of river segments that will become suitable if that alternative is selected. The analysis evaluates the gains or losses to all resources if Congress were to designate the river. Each alternative also includes interim management prescriptions for each suitable river to protect the outstandingly remarkable values until designation occurs. The rivers in the selected alternative are then recommended to Congress for designation.

Bohemia Mountain Analysis Area

Duncan Salt Chuck Creek was one of the 112 rivers tentatively eligible for further consideration as a potential addition to the National Wild and Scenic River System. This stream originates within the analysis area and will likely have to be crossed by one or more roads should a timber sale be conducted in the area. This stream was initially considered in the current revision of the Tongass Land Managment Plan and was not recommended in the Regional Forester's preferred alternative identified in the Draft EIS for the revised Plan. Since the final revised Plan may not be completed until 1992 and the Bohemia Mountain timber sale is proposed for sale prior to that time, further assessment of the suitability for designation of this stream will be conducted as part of the timber sale analysis. A copy of the suitability study has been incorporated into this Draft EIS (Appendix E). No other streams in the analysis area were identified as eligible for designation.

Cultural Resources

Cultural resources include the evidence of past human activity, potentially dating from the first occupation of southeast Alaska to the recent past. Information on the prehistory of the region is limited and that of Kupreanof Island is poor. Sources include "A Cultural Resource Overview of the Tongass National Forest" (Arndt, et al. 1987) and "Raven's Wrinkled Foot: A Cultural Resources Overview of Kupreanof Island, Southeast Alaska" (Campbell 1988).

Kupreanof Island was once occupied exclusively by two Tlingit groups, the Kakekwan and the Stikinekwan. The line of division was reported to have run roughly north and south through Kupreanof Island, from Portage Bay on the north to a midway point between Point Barrie and Totem Bay on the south. The Kakekwan controlled west of the division line, while the Stikinekwan controlled the area to the east. At the time of Euroamerican contact, the Kakekwan Tlingit was comprised of at least nine clans, while at least five Stikinekwan Tlingit clans used various portions of eastern Kupreanof Island. Each clan owned tangible property, such as salmon streams, berry patches, offshore waters for hunting sea mammals and bottom fish, and both winter and summer homes; as well as intangible property including crests, house and personal names, songs, and origin myths.

European discovery of Portage Bay was made in August 1794, by a survey party from Vancouver's expedition, but made no mention of aboriginal sites. The placename originated from the Russians who explored the bay in the late 1840s. An 1848 Russian nautical chart (Russian Hydrographic Department Chart 1396) reveals the name of Perenosnaia Bhutka, which translates as Portage Bay. The name apparently refers to Tlingit use of a canoe portage trail connecting Portage Bay with Duncan Canal to the south. In 1869, it was called Perenosnaia Creek by Commander R.W. Meade of the U.S. Navy. The Coast Pilot of 1883, indicates Portage Bay..."is well adapted for steamers, and is considered an excellent anchorage notwithstanding its narrow entrance, as it has no channel dangers. The regular rounds of Russian Company trading vessels included a visit to this harbor."

Historic period sites (at least 50 years old) may include commercial fish processing sites, cabins, camps, fur farms, logging, animal trapping, and mineral exploration. Several historic mining sites were identified at the head of Duncan Canal, south of the analysis area. None of the claims were extensively developed. Commercial logging began on Kupreanof Island by 1913, and continues today. Several early logging operations were based in Portage Bay.

Reconnaissance and complete cultural resource inventories have been completed for various Forest Service activities on Kupreanof Island, including several within the analysis area. This information is filed in the Stikine Area Supervisor's Office, but is generally not available to the public because of the sensitivity of the sites. A 1975 archeological and historical inventory of the region conducted by Sealaska Corporation identified no historic or cemetery sites within the analysis area.

A total of six cultural sites, five historic and one aboriginal, are currently listed on the Alaska Heritage Resource Survey (AHRS) for the Bohemia Mountain area. Three aboriginal sites and one historic special use permit site have been reported but not verified.

Visual Resource

Landscape Character

The landscape of the Bohemia analysis area is common to the Kupreanof Lowlands visual character type. Mountain peaks that would appear ordinary in other areas are more visually significant here because of the expansive adjacent lowlands. The Bohemia and Missionary Ranges are the most visually prominent landforms within the analysis area and attract viewer attention, as well as being the most prominent landforms along most of the north shoreline of Kupreanof Island. Both ranges offer little visual variety. They are evenly timbered and few alpine openings are apparent within the analysis area boundary, although alpine is common immediately eastward.

Sensitive Viewpoints

The analysis area is viewed predominantly from Frederick Sound to the north, a highly sensitive travel route due to its heavy recreational and commercial use. Ferry boats and small cruise ships view the area as middleground and background (½ to 5+ miles), and commercial and sports fishermen often troll or jig within the foreground distance zone (½ mile or closer).

Portage Bay is considered a highly sensitive route due to its frequent recreational use by both local residents and small groups of tourists. Foreground scenery within Portage Bay consists of shoreline timber; the Missionary Range and low elevation knobs to the west are viewed as middleground. The Bohemia Range is viewed in the far middleground.

A seldom used hiking trail passing from Petersburg Lake to Portage Bay to Duncan Salt Chuck (Portage Mountain Loop Trail) offers views through muskeg openings to portions of the analysis area not seen from saltwater.

Seen Area

Approximately 34 percent of the Bohemia Mountain analysis area is seen from sensitive viewpoints (see Map 3-9). Of this seen area, approximately 36 percent is land that has already been harvested or is scheduled for harvest (operable CFL) under the current Forest Plan. To a casual observer, roughly 4 percent of this seen area actually appears harvested; several older units are no longer considered obvious openings. (This figure represents actual acres harvested, not adjacent unharvested areas that are visually affected by harvest.)

Approximately 40 percent of the available commercial forest land (CFL) in this analysis area is seen from nearby travel routes. Broken down by VCU; 80 percent of the operable CFL in the Portage Bay VCU (442) is seen, and 30 percent of the operable CFL in the Bohemia Mountain VCU (424) is seen.

Visual Quality Objectives (VQO's)

VQO's are standards for managing visual change in the landscape. They suggest varying degrees of acceptable modification based on viewing distance, landscape character, and viewer interest in scenic quality. In areas of high scenic quality and high viewer interest, VQO's of "partial retention" and "retention" suggest managing for little or no visible change in the landscape. VQO's of "modification" and "maximum modification" indicate the area is rarely seen or is relatively low in scenic value, and change would not be noticeable or of great social consequence.

The VQO's described below and displayed in Map 3-10 represent the current "inventory" of desired objectives, given only visual resource management concerns. These inventory VQO's may or may not be met by the selected alternative. Selection of the preferred alternative involves consideration of all resource concerns for an area and includes the decision of whether or not to meet inventory VQO's.

Sixty-nine percent of the landscape seen from saltwater has a VQO of "partial retention." Under a partial retention objective, management activities may be evident but should remain subordinate to the characteristic landscape. Natural forms and patterns should remain dominant.

The landscape seen as foreground along the Portage Bay shoreline (8 percent of the seen area) is mapped as "retention" VQO. Under the "retention" objective, management activities may take place but should not be obvious to a casual observer. The north Kupreanof shoreline is a "partial retention" VQO, as it is seen in middleground from the ferry lane.

The remaining 23 percent of the seen area, including the foreground of the Portage Mountain Loop Trail, has been assigned a "modification" VQO. This objective allows management activities to dominate the characteristic landscape, but these activities should appear as a natural occurrence when viewed in the foreground or middleground.

Of the nonseen area, 10 percent has been given a "modification" VQO, and 90 percent a "maximum modification" VQO. The difference in VQO designation is due to changes in landscape character. Under a "maximum modification" objective, management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Visual Management Classes (VMC's)

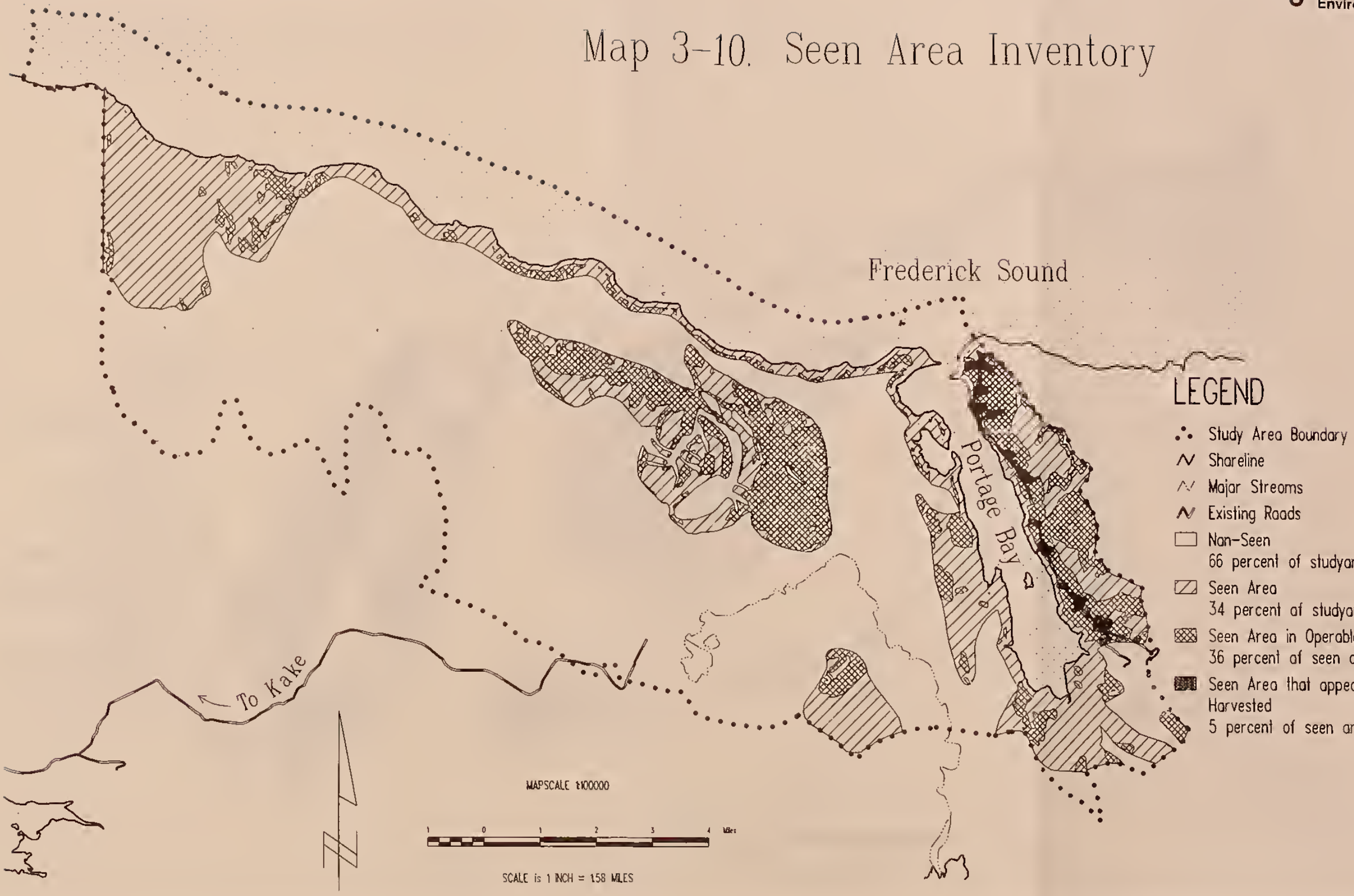
VMC's identify areas where greater care may be needed in designing management activities to be consistent with VQO's. VMC's combine VQO and terrain data (such as percent slope) to identify the relative ease with which VQO's may be met given certain ground conditions. For example, an area with VQO's of "retention" or "partial retention", combined with steep, evenly-timbered slopes will often result in a higher cost of doing business, or a compromise of scenic quality, or perhaps both.

Map 3-11 identifies VMC's for the analysis area. Approximately 23 percent of the entire analysis area, 67 percent of the seen area, is mapped as VMC's 1 and 2, the most sensitive. Proposed activities which overlap these VMC's will need extra attention during project design and layout. VMC's 3 and 4 indicate areas where inventory VQO's will be easier to meet or where management activities are not likely to be seen.

Existing Visual Condition (EVC)

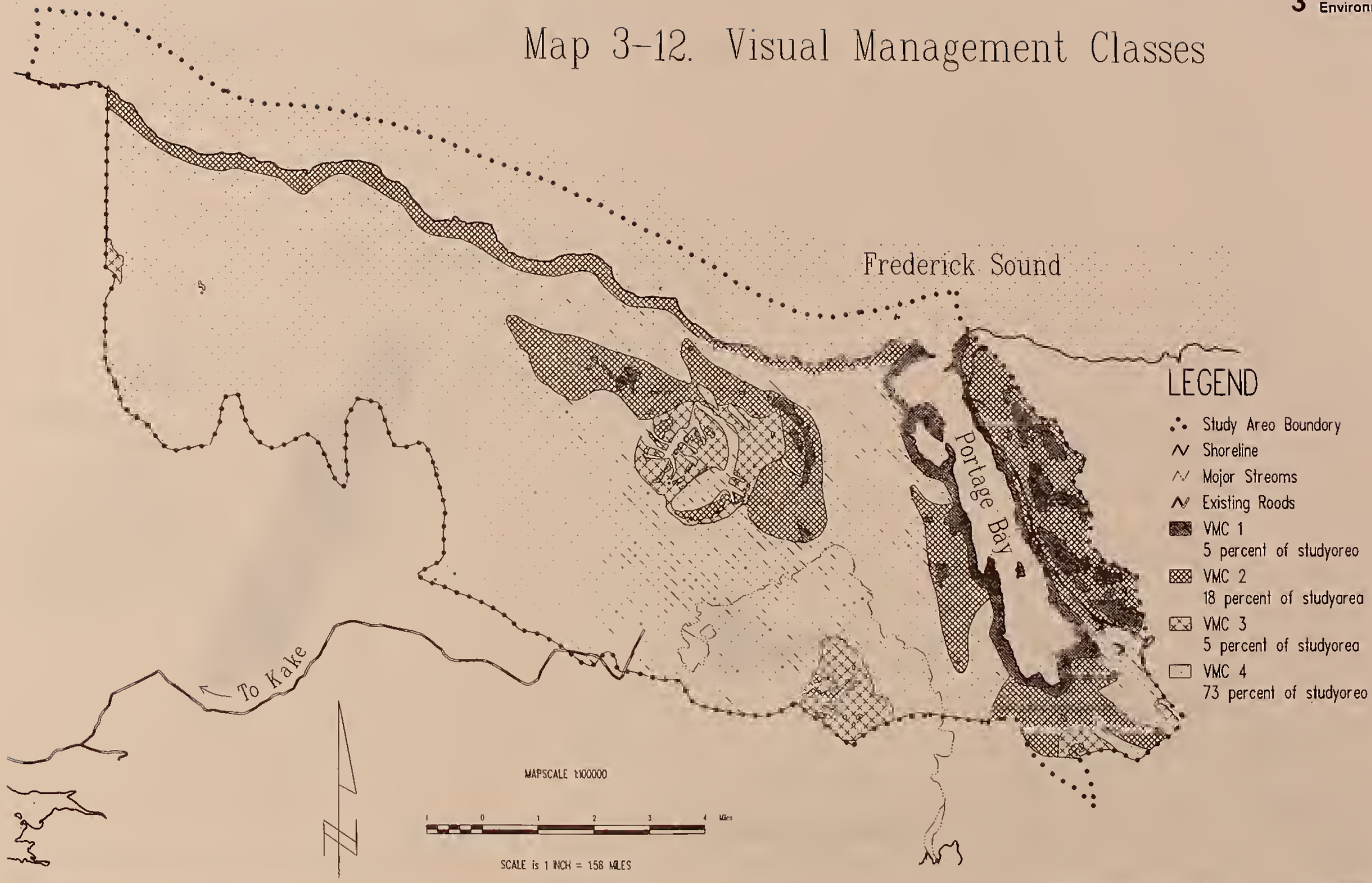
Related to the question of how easily change may be incorporated into the landscape is the question of what has happened there already. Previous change can make additional change less noticeable if activities were well designed. If they were not well fitted to the landscape, previous activities may prompt a negative reaction to additional change. Site modification both within and outside the analysis area must be considered when estimating cumulative effects.

Map 3-10. Seen Area Inventory

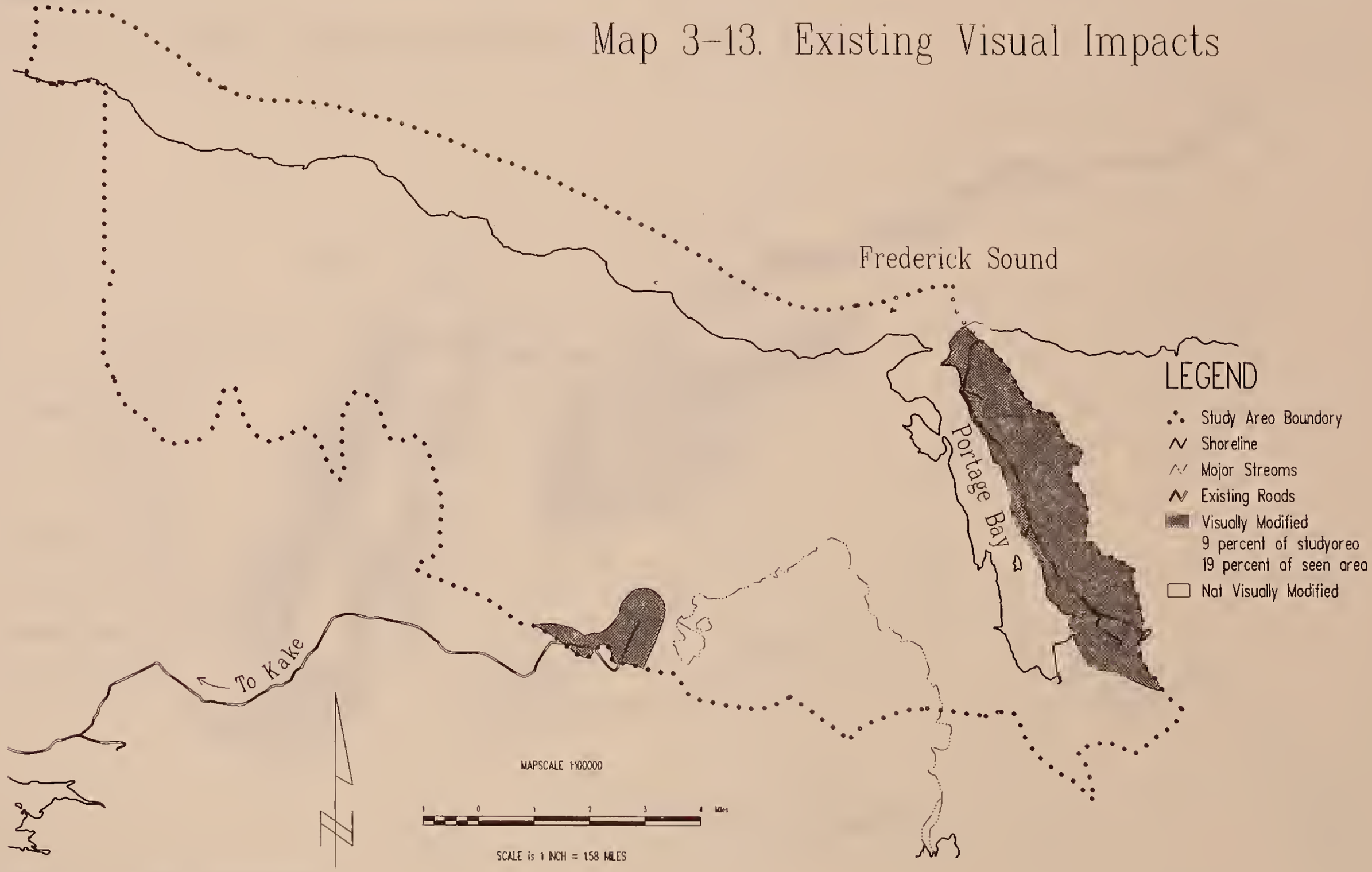


Map 3-11. Inventory Visual Quality Objectives

Map 3-12. Visual Management Classes



Map 3-13. Existing Visual Impacts



Map 3-12 shows generally where past management activities are still visible within the analysis area. Currently, timber management activities have altered approximately 9 percent of the entire analysis area and 19 percent of the seen area. These activities have focused primarily on the east side of Portage Bay. Other visual impacts include the private recreation cabin on Hook Point, and Forest Road 6030 (white rock road). (These figures include the adjacent lands that are visually affected by actual modifications; an entire drainage may appear modified because of a clearcut along the bottom.) Cumulative effects are likely to be greatest in areas where existing modifications overlap with more sensitive VMC's 1 and 2 and with proposed new activities.

Outside the analysis area, a boater on Frederick Sound will encounter several nearby areas already clearcut. From Petersburg, the Twelvemile and Todahl sale areas can be seen prior to arriving at the Bohemia Mountain analysis area. Between Kake and Bohemia Mountain, large clearcuts on Native lands can be seen.

Forest Plan Direction

The current Forest Plan, amended in the winter 1985-86, directs that "VQO's will range from "partial retention" to "maximum modification," with the higher quality objectives being applied on those lands viewed from the ferry lane in Frederick Sound." This is interpreted to mean that land viewed from the Frederick Sound ferry lane will be of primary concern, and will receive a "partial retention" VQO as a minimum. Lands seen from Portage Bay have been inventoried as "partial retention," but will receive secondary consideration if compromises are necessary during the project planning phase.

Minerals

There are no known existing mining claims in the Bohemia Mountain analysis area. One patented claim exists outside the analysis area adjacent to the Petersburg Creek-Duncan Salt Chuck wilderness boundary which would not be affected by any proposed activity. Mineral potential may exist and it is possible that prospecting might occur if roads are built.

Lands

All lands within the analysis area are National Forest System Lands. There is one private recreation cabin in Portage Bay, authorized by special use permit. There is a logging camp site and log transfer facility in Portage Bay.

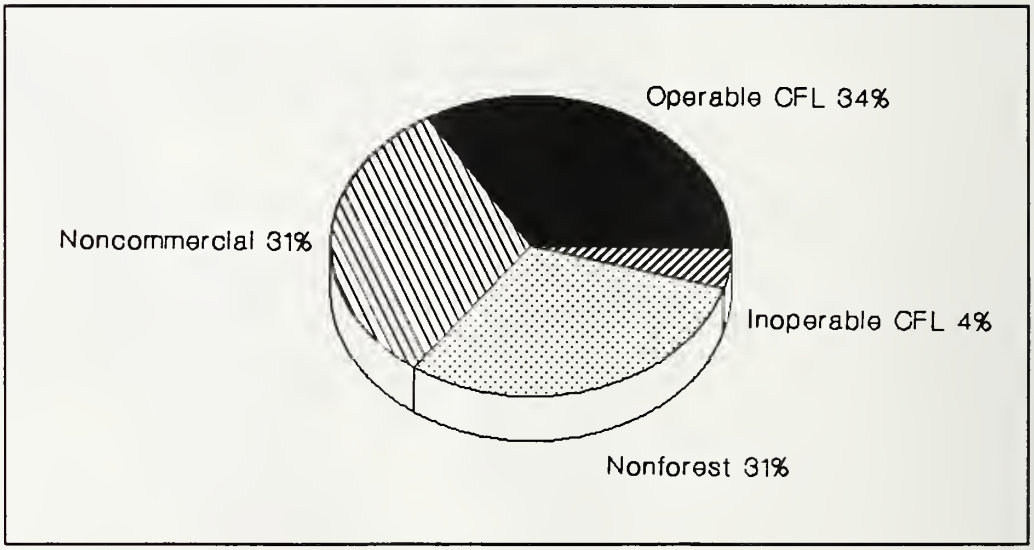
Timber

The Bohemia Mountain analysis area lies in the coastal temperate rain forest. A detailed description of the timber and vegetation characteristics is available in the *Southeast Alaska Area Guide*, the *Forest Ecosystem of Southeast Alaska (volumes 7 and 9), Preliminary Forest Plant Associations of the Stikine Area*, and the *Final Environmental Impact Statement* for the Tongass Land Management Plan.

No threatened or endangered plant species are known to exist in the analysis area, although information on minor species is limited.

The Bohemia Mountain analysis area is composed of approximately 20,663 acres of nonforested land and 47,025 acres of forested land. Of this forested land, approximately 21,185 acres are noncommercial forest and 25,840 acres are commercial forest. The commercial forest land (CFL) consists of approximately 2,970 acres of inoperable CFL which is not available for timber harvest and approximately 22,870 acres of operable CFL suitable for harvest. The operable CFL is comprised of approximately 16,725 acres of normal CFL and 5,515 acres of nonstandard CFL. Inoperable CFL are those stands which, if harvested, would have a high potential for resource damage, or stands whose physical limitations make harvest of trees uneconomical or impractical. The primary difference between normal operable and nonstandard operable CFL is that normal stands have less potential for erosion and slope failure than nonstandard stands. Normal operable stands may be logged using common harvest systems such as high lead, short-span skyline, or track loaders. Nonstandard operable stands require special yarding systems which result in less impact on soils, such as long-span skyline or helicopter logging.

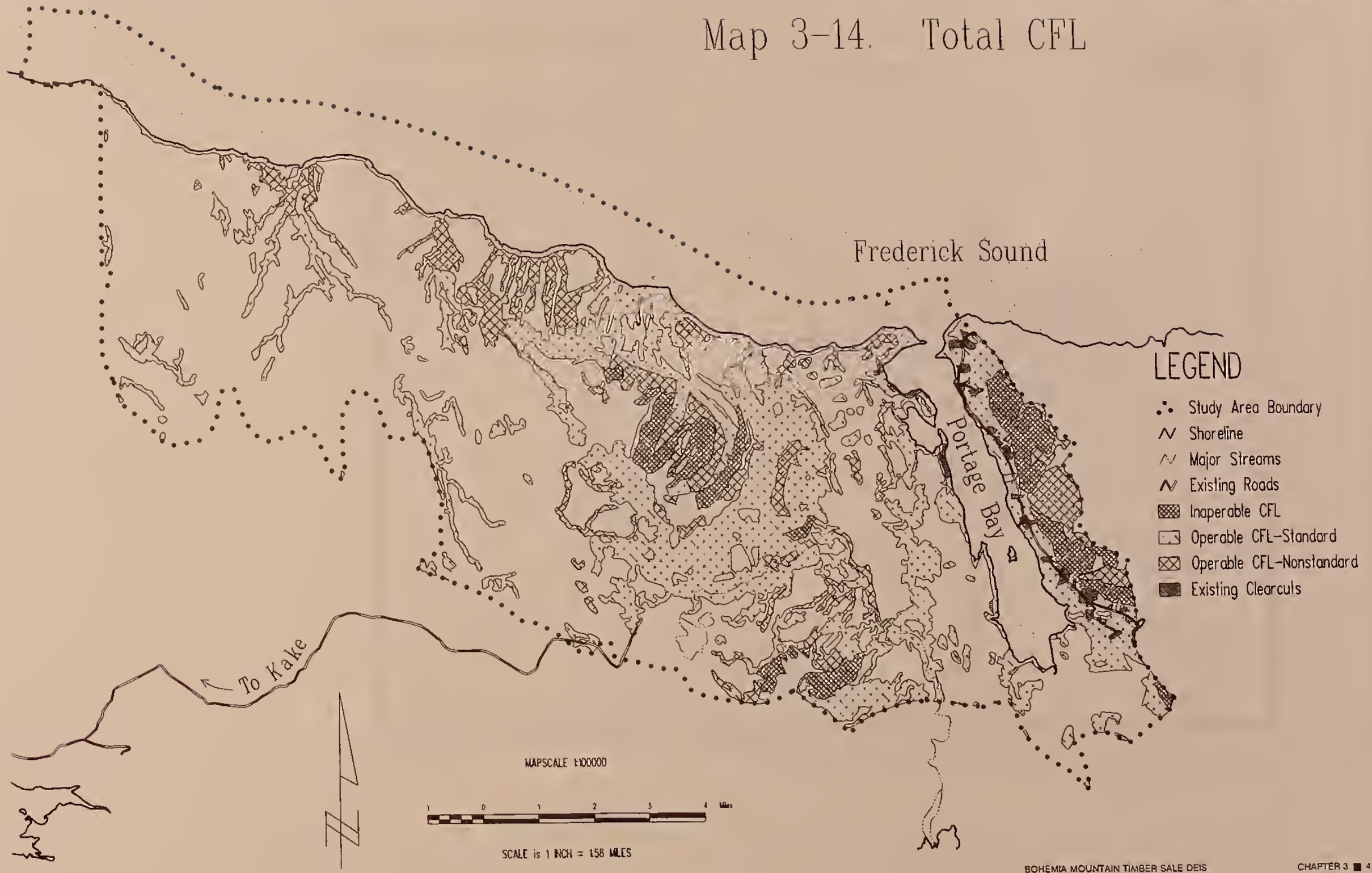
Figure 3-2. Bohemia Mountain Analysis Area Land Base.



The Bohemia area has a high percentage of poorly drained, low productive sites which cannot grow commercially valuable trees. The remaining commercial forest productivity is generally moderate. The low- to moderately-productive growing sites produce low- to medium-volume timber stands. Higher volume stands are located on the better-drained sites along the streams and on the steeper mountain slopes while the lower volume stands occur on the poorly drained sites at higher elevations. Site index and volume class are used to measure site productivity.

Approximately 11 percent of the commercial forest land is volume class 6 (30-50 MBF per acre), 42 percent is volume class 5 (20-30 MBF per acre), and 47 percent is in volume class 4 (8-20 MBF per acre). The analysis area has no volume class 7 (50 + MBF per acre). Table 3-9 displays the volume class distribution of the operable commercial forest land by acreage.

Map 3-14. Total CFL



Map 3-15.

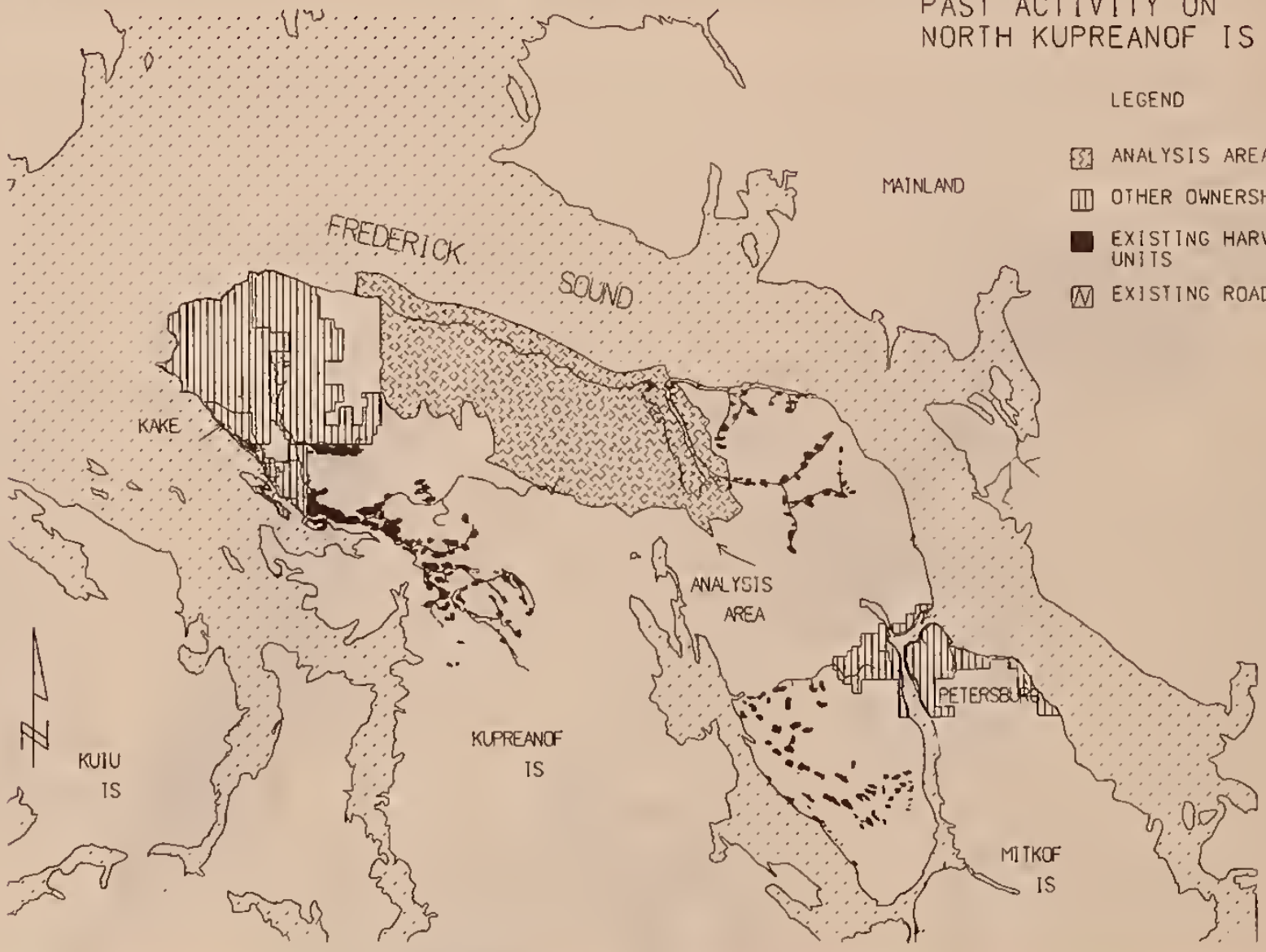

PAST ACTIVITY ON
NORTH KUPREANOF IS
LEGEND
ANALYSIS AREA
OTHER OWNERSHIP
EXISTING HARVEST UNITS
EXISTING ROADS
MAINLAND
FREDERICK
SOUND
KAKE
ANALYSIS
AREA
PETERSBURG
KUIU
IS
KUPREANOF
IS
MITKOF
IS

Table 3-9. Bohemia Mountain Analysis Area Volume Class Distribution by Acres.

Volume Class	Board Feet Per Acre	Commercial Forest Land Acres (%)	Operable CFL Acres (%)
4	8-20,000	11,982 (46)	11,148 (49)
5	20-30,000	10,897 (43)	8,760 (38)
6	30-50,000	2,961 (11)	2,961 (13)
7	50,000	0 (0)	0 (0)

Commercial forest species on the area include Sitka spruce, western hemlock, Alaska cedar, and mountain hemlock. Noncommercial forest species include lodgepole pine and alder.

The commercial forest stands on the area occur predominantly as uneven-aged and over-mature old growth stands. A minor component of the commercial forest exists as even-aged stands of varying ages which originated from timber harvest or from catastrophic windstorms.

The old growth commercial stands have an average species composition which varies between volume classes and which consists of approximately 77 percent hemlock, 16 percent Sitka spruce, and 7 percent Alaska cedar.

The old growth forest stands are declining in productivity, and wood defect and decay is estimated to be as high as 36 percent of the volume. Dwarf mistletoe is present in most old growth hemlock stands. Much of the Alaska cedar on the area is dying, as is the case generally thoughout southeast Alaska.

Approximately two percent (434 acres) of the operable commercial forest land in the analysis area has been previously harvested and converted to second growth. All of the second growth stands have been certified as adequately stocked, exhibit vigorous growth, and have a stocking range from a well-stocked to overstocked condition.

Tongass Land Management Plan

Land on the Tongass National Forest has been categorized based on its vegetative cover as commercial forest land (CFL), noncommercial forest land, or nonforest using the Tongass Land Management Plan (TLMP) aerial photo point inventory. Acres of CFL in each volume class have been estimated for the analysis area using the Forest Plan aerial photo point inventory and a more recent and intensive set of inventories which included stand examinations, soil surveys, and aerial photo analysis. (See Table 3-9.) TLMP data is statistically accurate for the Tongass National Forest, although the figures become less accurate when broken down by analysis area. An updated inventory of CFL was entered into a computer database and used in this Bohemia analysis. This new inventory is considered to be more accurate for the Bohemia Mountain analysis area than the Forest-wide inventory.

Employment

The timber and fishing industries provide the majority of all jobs in the primary employment sector in southeast Alaska. In Petersburg, seafood harvesting and processing are the primary employers, followed by Federal, State, and local government, and timber harvesting. Kake is located on the northwestern side of Kupreanof Island, on Keku Straits. The majority of the people earn their living by fishing; logging; educational, health and social services; and transportation, communication and utilities. In Wrangell, timber harvesting and milling are the primary employers, followed by Federal, State, and local government, and seafood harvesting and processing. Alaska Pulp Corporation sawmill is the town's largest employer, and tourism is an emerging industry.

Transportation

Roads

The Bohemia Mountain analysis area has roads connecting it to the village of Kake. Kake is an Indian village, with an estimated population of 600, located on the northwest end of Kupreanof Island, facing Keku Strait. Air taxis, both float and wheeled, provide scheduled trips to Kake. The Alaska Marine Highway feeder system ferry *MV LeConte* provides twice-weekly landings in Kake, northbound from Petersburg and southbound to Petersburg.

The analysis area also has an isolated road system that originates at the log transfer facility and logging camp in Portage Bay and provides access to the Todahl Creek area northeast of Portage Bay, the eastern side of Portage Bay, and the Portage Creek/Twelve-mile Creek drainages southeast of Portage Bay. Access to this road network is only by boat or sea plane. Currently, the Kake and Portage road systems are not connected.

There are close to 90 miles of existing Forest Development Road (FDR) in the Kake transportation network and nearly 50 miles of existing FDR in the Portage Bay network. Within the analysis area there are 10.5 miles of the Kake network and 7.5 miles of the Portage network.

Log Transfer Facilities

There are two existing log transfer facilities (LTF) which can provide access to saltwater for timber harvested from the analysis area. Either or both sites may be used for this project.

The Little Hamilton LTF is located approximately 10 miles south of Kake outside the analysis area. Nearly 175 million board feet of timber has previously been transferred into the water over this LTF, and it is currently available for use. In 1983 this facility was reconstructed from a log bulkhead to a concrete pile supported dock facility, designed for A-frame or crane lift-off which provides a controlled, non-violent entry of logs into the water. The current design is limited to handling small volumes of timber. Any significant increase in volume of timber going through the LTF will require additional redesign and reconstruction. The current permits for this LTF are valid until December 2017.

The Portage Bay LTF was constructed in 1982 as a log "beaver slide" and was reconstructed in 1986 as an endless chain conveyor system which provides gentle entry of logs into the water. This facility also includes an airplane float and ramp. Nearly 80 million board feet of timber have passed through this facility and it is currently an active LTF. Although dual operator use of this LTF has not occurred, it is considered feasible for two operators to water logs from two sales at this facility simultaneously.

Logging Camps

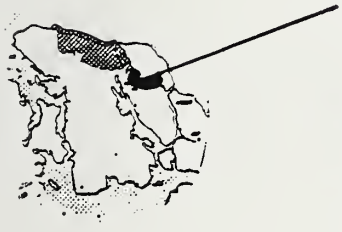
There are logging camps located at both Portage Bay and near Kake. The Kake camp is located on Forest Highway 40, about three miles south of Kake, and provides room for 40 people. The Portage Bay camp is located approximately three miles south of the LTF and is designed to accommodate 80 people.

Administrative Sites

Forest Service Administrative facilities located at the logging camps are designed to house 11 workers at Kake and 16 workers at Portage Bay.

Other Past or Planned Activities In the Surrounding Area

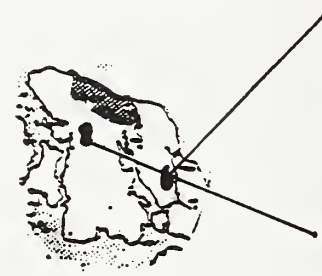
A number of projects have occurred, are currently in progress, or are proposed for the near future on nearby National Forest System lands on Kupreanof Island. Although the projects may not directly affect the Bohemia Mountain Timber Sale, they are discussed here in order to provide a more complete context within which that sale is being considered.



Portage-Twelve Mile Timber Sale

In April 1975, a timber sale was offered in the Portage-Twelve Mile area. A total of 48.73 MMBF of timber was harvested on 2,327 acres in 37 units. Seventy-two acres were cleared for roads and ten acres for a logging camp, for a total of 2,409 acres. Three miles of road were reconstructed and 19.2 miles of new road were constructed. This sale was never sold as an independent sale, but was sold as substitute volume under the Alaska Lumber & Pulp Co. long-term contract during the 1976-81 operating period. Harvesting was completed in 1984.

Hamilton Creek South Timber Sale
An Environmental Assessment was completed in June 1975, and the sale was offered as an independent sale four times and never sold. It was offered in March 1976 with 31.6 MMBF; December 1976 with 31.2 MMBF; March 1977 with 23.69 MMBF; and August 1977 with 23.69 MMBF. This timber was eventually incorporated into the Alaska Lumber & Pulp Co. long-term contract as substitute volume when some land under contract near Hoonah became unavailable. This substitute volume was harvested by Virgil Soderberg from 1976 to 1981. Total volume harvested was approximately 31.6 MMBF and 0.4 miles of temporary road were constructed.

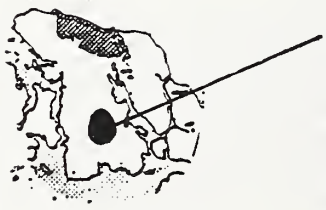


Tonka Mountain Timber Sale
This sale, awarded in December 1978, is currently being harvested and will terminate on May 31, 1991. This sale was designed to harvest 55.5 MMBF consisting of 35 clearcut units totalling 1692 acres and two partial cut units totaling 347 acres. Thirty-two miles of Forest Development roads were constructed and approximately 14.42 miles of temporary road will be constructed.

North Irish Creek Timber Sale
An EIS was completed in March 1977, and the sale, awarded in 1980, is currently being harvested. It is scheduled for completion by May 31, 1993. This sale was designed to harvest approximately 47.18 MMBF of timber in 31 clearcut units totalling 1,775 acres and to construct 39 miles of Forest development roads, clearing an additional 93 acres.

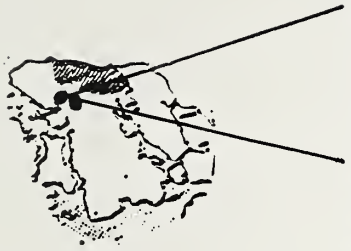
Bohemia Timber Sale
An Environmental Assessment (EA) was completed in December 1982, documenting a sale to harvest 24.1 MMBF of timber in 18 clearcut units and construct 28.9 miles of road. This sale never sold. However, three of the units from this sale are now part of the "Combination Timber Sale" currently being harvested.

Todahl Timber Sale
An EA was completed in April 1983, and the sale was harvested from 1983 through 1990. There are 26 clearcut units totalling 1,081 acres and containing approximately 36.16 MMBF. Sixty-seven acres were cleared for 17.1 miles of specified road and 2.7 miles of temporary road.



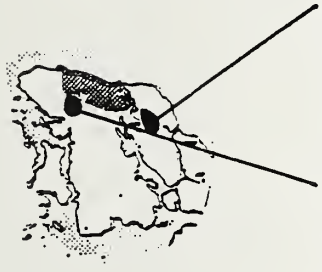
Totem Timber Sale
An EA was completed in April 1984 for this sale on the unroaded south end of Kupreanof Island. Construction of approximately 18.8 miles of road was intended to harvest 46.67 MMBF of timber on 2,404 acres. One harvest unit, reviewed and approved by the Regional Forester, is designed to be 430 acres in size. This sale never sold and the environmenal document will likely need to be revised before a sale in this area can be offered.

Toncan Timber Sale
An EA was completed in September 1984. Twenty-two clearcut units totaling 1,501 acres were designed which contain approximately 56.35 MMBF of timber. Approximately 18.65 miles of new road, 7.73 miles of temporary road were constructed, and 2.37 miles were reconstructed, resulting in 37 additional acres cleared. The operator is currently finishing up the sale and the Forest Service is in the process of closing this sale.



Cathedral Timber Sale
An EA was completed in August 1986, but the original sale never sold. It was designed to harvest 9.6 MMBF of timber and construct 5.1 miles of road. This was to be accomplished in a series of small sales.

Pipeline Timber Sale
An EA was completed in December 1986 but was not purchased when offered for sale. All units from this sale were subsequently incorporated into the "Combination Timber Sale," which was sold in September 1989.



Missionary Timber Sale
An EA was completed in May 1989 to harvest approximately 4.5 MMBF of timber from three clearcut units totaling 213 acres in an area previously given access by the "Portage/Twelve-Mile Sale." No new forest development roads will be constructed. This sale was sold in September 1989 and will terminate March 31, 1993.

Combination Timber Sale
This sale, awarded in September 1989 and scheduled for completion on March 31, 1994, is a combination of all the original "Pipeline Timber Sale" units and three of the original "Bohemia Timber Sale" units. It will harvest 590 acres in eight clearcut units and 24 acres along three miles of road for a total of 10.34 MMBF of timber.

Mitkof-Kupreanof Small Timber Sale
This timber salvage planning effort includes proposed harvest units on both Mitkof and Kupreanof Island. Proposed units in the Portage-Twelve Mile area include 2.2 - 3.5 MMBF of timber. Approximately 0.9 miles of temporary road would be built. The environmental assessment for this project is planned to be completed in June 1991. Timber harvest could begin in spring 1992.

Forest Plan Revision

The Tongass National Forest Land Management Plan (the "Forest Plan," or "TLMP") is currently being revised. As part of the revision process, changes in management direction for the Bohemia Mountain analysis area will be considered. Even so, management activities will continue under the direction of the current plan until the revision process is completed. The proposed timber sale is consistent with the current plan direction and is scheduled to be sold prior to the completion of the revised plan.

Chapter 4

Chapter 4

Introduction

This chapter describes the physical, biological, economic, and social effects likely to result from putting each of the alternatives into effect. A summary of the consequences of each alternative is displayed in Table 2-1 in Chapter 2. The information has been taken from more detailed reports that are available for public review in the planning record, located at the Stikine Area Supervisor's Office, Petersburg, Alaska.

Adverse Environmental Effects Which Cannot Be Avoided

There are some adverse effects which cannot be avoided if one of the action alternatives is selected.

Harvest in the Bohemia Mountain analysis area would reduce the number of old-growth stands. As a result, the carrying capacity of the habitat would be reduced for old-growth dependent species.

Ground disturbing activities such as stream crossings and culvert installation would temporarily increase silt loads in streams and tributaries within the analysis area. In addition, a small loss of fish habitat would occur at road crossings and in those portions of fish habitat occupied by culverts.

Timber harvest and road construction would change the appearance of the landscape. The area where change would be most noticeable is from Frederick Sound along the north shore of Kupreanof Island and in Portage Bay. The effects would diminish as the vegetation grew back.

Short-Term Use Versus Long-Term Productivity

One of the major benefits of timber harvest is the increased growth rate of the new trees (regeneration). In old-growth climax stands, annual growth is offset by mortality so that net growth is zero (Hutchison and Labau 1975). In contrast, young-growth stands will produce, on a 100-year rotation on an average site, about double the cubic foot volume maintained in most old-growth stands (Taylor 1934). Each action alternative would improve the production of merchantable timber by converting old-growth climax stands to highly productive, even-aged, young-growth stands. In addition, production of merchantable wood can be further increased if, after the site is harvested and regenerated, the new stands are precommercially thinned.

Irreversible Loss of Resources

An irreversible loss is a permanent or long-term use of a resource that is not replaceable within a lifetime, including the destruction of a cultural site or consumptive use of minerals. In the Bohemia Mountain analysis area, for example, cultural artifacts and cultural sites could be irreversibly disturbed as a result of the timber sale. Subsurface cultural sites that cannot be located with surface surveys are especially vulnerable. The harvest of old-growth timber in the Bohemia Mountain analysis area is also an irreversible loss because the stands may take 200 to 300 years to develop into old growth and the commitment of this resource to timber harvest is reversible only over a long period of time.

Irretrievable Commitment of Resources

An irretrievable commitment is a decision that makes other choices unavailable during the life of the commitment. The decision cannot be retrieved for the time that has already passed, but could be changed in the future.

Timber harvest and road construction would irretrievably remove the opportunity to use those parts of the Bohemia Mountain analysis area for primitive, unroaded recreation until the vegetation grows back. The construction of roads and the establishment of rock pits is also considered an irretrievable commitment that would reduce or eliminate soil productivity on those sites unless they are rehabilitated. The establishment of buffer strips around eagle nest trees, around cultural sites, and within aquatic habitat management units (AHMUs) makes these buffer areas unavailable for timber harvest.

Watershed

The exact impacts of a timber harvest and related road building on water quantity and quality are largely hidden within complex relations involving many diverse watershed features. The following indicators allow us to estimate possible risks to watershed, stream, and water quality:

1. The length of stream channels near harvest units (within about 100 feet) that have banks and/or sideslopes sensitive and susceptible to damage.

2. The number, length and type of roads built, and the number of stream and riparian area road crossings required.

3. The cumulative proportion of area harvested in a watershed, with consideration given to its overall "sensitivity" based on factors including soil erodibility, stream stability, and drainage density.

4. Mitigation measures applied, including Best Management Practices (BMPs), Forest Plan guidelines, and site specific prescriptions.

Length of Affected Stream Channels

Risk of water quality degradation increases with the amount of near-stream harvest, and risk is greater where both sides of a channel are affected. Buffer strips, when put in place to protect sensitive banks and riparian areas, reduce this risk considerably; still, windthrow can cause increased sedimentation. Table 4-1 summarizes stream lengths that would be potentially impacted by harvesting units near streams in a given alternative. Data are expressed in terms of the management concerns mentioned in Chapter 3--sideslope stability (V-notches and areas where streambank composition minimizes bank stability concerns) and streambank stability (alluvial channels and similar areas where most (not all) buffer strips may be implemented). Data is also differentiated by whether harvest units would occur on one or both sides of a channel. In terms of overall affected stream length, streams would be subjected to the greatest risk by alternative 5, where 6.4 miles of stream would be near a pass-through harvest unit. The rest of the streams follow, in decreasing order: 5A (5.8 miles), 4 (5.2 miles), 3 (5.1 miles) and 2 (4.5 miles).

Table 4-1. Length of Streams in or near Proposed Harvest Units (within about 100 feet). Percentages below the subtotals and totals describe their part of the total lengths given in Chapter 3 for the two stream management concerns.

Management Concern	Length of Streams Near Units (Miles)					
With harvest units on:	**ALT 1**	**ALT 2**	**ALT 3**	**ALT 4**	**ALT 5**	**ALT 5A**
STREAM BANKS						
One side of stream	0	0.9	0.7	1.9	3.2	2.6
Both sides of stream	0	0.2	0.0	0.2	0.2	0.2
Subtotals:	0 (0%)	1.1 (1%)	0.7 (0.7%)	2.1 (2.0%)	3.4 (3.3%)	2.8 (2.7%)
SIDE SLOPES (including V-notches)						
One side of stream	0	3.5	2.2	2.3	4.9	4.5
Both sides of stream	0	0.2	0.2	0.8	1.2	1.0
Subtotals:	0 (0%)	3.7 (2.6%)	2.4 (1.7%)	3.1 (2.1%)	6.1 (4.3%)	5.5 (3.9%)
OVERALL (stream banks plus side slopes)						
One side of stream	0	4.4	2.9	4.2	8.1	7.1
Both sides of stream	0	0.4	0.2	1.0	1.4	1.2
Totals:	0 (0%)	4.9 (1.9%)	3.1 (1.3%)	5.2 (2.1%)	9.5 (8.9%)	8.3 (3.4%)

Roads and Stream Crossings

The Transportation and Landform and Soils sections of this chapter include information regarding the type and length of roads to be constructed. Other factors being equal, the greater the total road length, the higher the risk of water quality degradation. Data from these sections indicate that Alternative 5 would require the most new construction of roads (37.5 (south route) or 34.2 (north route) miles), followed in decreasing order by Alternative 5A (26.7 (south) or 23.5 (north) miles), Alternative 4 (23.3 (south) or 21.1 (north) miles), Alternative 2 (17.2 (south) or 13 (north) miles) and Alternative 3 (1.9 (either route) miles). The number of road crossings over inventoried streams for the action alternatives (in decreasing order) are Alt. 5 (30); Alts. 4 and 5A (21); Alt. 2 (9); Alt. 3 (0). Additional field work will be necessary to determine the environmentally preferred location for the road paralleling Duncan Salt Chuck Creek.

Cumulative Effects

Cumulative Length of Affected Stream Channels

The cumulative effect of harvest units on streams includes the additive effect of stream lengths near proposed (Table 4-1) as well as existing harvest units. Cumulative harvest impacts will only occur on the east side of Portage Bay since there is no previous harvest on Bohemia Mountain. In terms of overall affected stream length, streams would be at greatest risk under the cumulative effects of Alternative 5, where 7.5 miles of channel would be near or pass through units (Table 4-2). Following, in decreasing order, are Alternatives 5A (6.9 miles), 2 (5.6 miles), 4 (5.5 miles), and Alternative 3 (4.2 miles). Selection of Alternative 1, the No Action Alternative, would have the cumulative result of 1.7 miles of affected channel due to units already harvested.

Table 4-2. Cumulative Length of Streams in or near Proposed and Existing Harvest Units (within about 100 feet). Percentages below the subtotals and totals describe their part of the total lengths given in Chapter 3 for the two stream management concerns.

Management Concern	Length of Streams Near Units (Miles)					
With harvest units on:	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 5A
STREAM BANKS						
One side of stream	0.2	1.1	0.9	2.1	3.4	2.8
Both sides of stream	0	0.2	0	0.2	0.2	0.2
Subtotals:	0.2 (0.2%)	1.3 (1.3%)	0.9 (0.9%)	1.2 (1.2%)	3.6 (3.4%)	3.0 (2.9%)
SIDE SLOPES (including V-notches)						
One side of stream	0.7	3.9	2.7	3.0	5.3	4.9
Both sides of stream	0.5	1.0	1.0	1.3	2.0	1.8
Subtotals:	1.2 (0.8%)	4.9 (2.5%)	3.7 (2.6%)	4.3 (3.0%)	7.3 (5.2%)	6.7 (4.7%)
OVERALL (stream banks plus side slopes)						
One side of stream	0.9	5.0	3.6	5.1	8.7	7.7
Both sides of stream	0.5	1.2	1.0	1.5	2.2	2.0
Totals:	1.4 (0.6%)	6.2 (2.5%)	4.6 (1.9%)	5.5 (2.2%)	10.9 (4.4%)	9.7 (4.0%)

Cumulative Effects of Roads and Stream Crossings

At the end of this project, cumulative lengths of roads within watersheds include proposed new construction as well as previously constructed roads. The greatest cumulative length of roads would occur in Alternative 5 (37.5 (south route) or 34.2 (north route) miles), followed in decreasing order by Alternative 5A (26.7 (south) or 23.5 (north) miles), Alternative 4 (24.3 (south) or 21.1 (north) miles), Alternative 2 (17.2 (south) or 13 (north) miles) and Alternative 3 (1.9 (either route) miles). The "No Action" Alternative would maintain the existing total road length of 12.6 miles. The number of past and proposed road crossings over inventoried streams for the action alternatives follow (in decreasing order): Alt. 5 (48); Alts. 4 and 5A (39); Alt. 2 (27); Alts. 1 and 3 (18).

Cumulative Proportion of Area Harvested by Watershed Sensitivity

Sensitivities to watershed areas of southeast Alaska are gauged by a model developed by McCorison, et al. (1988) These sensitivities were used in conjunction with beneficial use indices to estimate watershed harvest thresholds of concern. Harvest levels that are near or over the threshold produce increased risk of water quality degradation. Factors considered in this model include drainage densities, average channel stabilities of various channel types, erodibility of the various soils encountered, and an index of beneficial use values.

First, the model assigns the watershed to one of four sensitivity classes. Then, the model considers the beneficial uses of the various streams and the sensitivity of their respective watersheds before assigning each watershed a recommended maximum harvest area. This percentage of the total watershed area is referred to as a watershed's threshold of concern.

When this test was run on the watersheds in the Bohemia Mountain analysis area, the results indicated that most of the analysis areas sites would contain cumulative harvest levels well below their threshold of concern. Examples are found in Table 4-3.

Table 4-3. Examples of Watershed Thresholds of Concern and Corresponding Harvest Percentages. Watersheds are referred to by their Alaska Fish and Game Catalog number. Map 3-4

Watershed	Threshold	Percent of Watershed Proposed for Harvest					
With harvest units on: (stream #)		ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 5A
110-16-06(7)	50	0	3	0	14	14	14
110-16-11(2)	50	0	0	0	0	0	0
110-43-59(10)*	25	0	2	0	2	2	2

*Duncan Salt Chuck including all sub-watersheds

One sub-watershed in the Duncan Salt Chuck watershed was determined to contain harvest unit area in excess of its estimated threshold of concern. This third order watershed is on the south side of Bohemia Mountain and contains several deep notches. The estimated threshold of concern for this sub-watershed is 10 percent. Alternative 2 would harvest 4 percent, Alternative 3 - 0 percent, Alternative 4 - 12 percent, and Alternatives 5 and 5A would harvest 12 or 13 percent each. Because this is a sub-watershed within one large watershed with an overall threshold as shown in Table 4-3, possible impacts will be mitigated to some extent due to the moderating effect of large watersheds. The uncertainty of the 12 or 13 percent for Alternative 5 and 5A will be finalized during field checking for the Final EIS. At this time, one of two proposed settings will be selected depending on which one will have the least impact on the water resource.

Mitigation Measures

Aquatic habitat management unit (AHMU; see Chapter 3, Fisheries) guidelines will be followed and regional Best Management Practices (BMPs) implemented. Site specific application of the BMPs will be done on the unit cards. These measures will minimize the effects on runoff processes and sediment transport. Such measures include site specific use of vegetated streamside buffer strips, full or partial suspension of logs when yarding across streams, "splitlined" harvest settings (streambanks used as boundaries), and minimizing of woody debris "loading" in stream channels. No noticeable long-term effects should occur, as southeast Alaska watersheds tend to recover quickly due to the resilience of the forest vegetation.

Landform and Soils

The risk of impact on soils from timber harvest is often rated in terms of soil hazard classifications. Soil hazard classes reflect the probability of soil movement resulting from logging or road building activities. The probability is related to a number of factors such as soil strength, soil wetness, and slope. The soils in the low hazard class are found on 0 to 35 percent slopes, are mostly stable in the natural setting, and have little probability of soil movement if disturbed. Moderate hazard soils are generally found on 35 to 75 percent slopes, are relatively stable in the natural setting, and have increased probability of movement if they are disturbed. The soils in the high hazard class are usually found on slopes greater than 75 percent, often creep or slide in a natural setting, and are extremely prone to soil movement if disturbed. Consequences from timber harvest are related to the number of acres harvested and the soil hazard class on which the trees are growing.

Timber Harvest and Soil Hazard Class

Table 4-4 shows the area of land in each hazard class that would be harvested for each alternative. This data is based on the Soil Resource Inventory for Kupreanof Island. Areas proposed for harvest on high hazard soils in Table 4-4, and roads to be built on high hazard soils in Table 4-5 will be field verified prior to the Final Environmental Impact Statement (EIS). Field verification will include an analysis of the risks of mass wasting and an evaluation of the potential impacts to other resources. Some changes in design and configuration of units and roads can be expected as a result of this on-site investigation.

Table 4-4. Area Harvested in Each Soil Hazard Class

SOIL HAZARD	ALTERNATIVE					
CLASS	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Low	0	317	216	303	664	519
Moderate	0	509	42	867	953	944
High	0	34	32	2	60	35
Total	0	860	290	1172	1677	1498

Road Building

Road building impacts are related to the length of road constructed and the soil hazard class in which each segment is built. Table 4-5 shows the miles of road in each hazard class for each alternative. A small amount of soil sliding and slumping is likely.

The upper Duncan Creek watershed, on the south side of Bohemia Mountain, has been identified as an especially hazardous area due primarily to the presence of V-notches deeply incised into "blue clay" deposits. An area of particular concern is the mainline road location between Bohemia Mountain and the steep gorge of upper Duncan Salt Chuck Creek. In general, the generic term "blue clay" is used to describe any relatively dense, relatively fine textured soil material with a grayish or bluish-gray color. The geologic origin and physical properties of the material are sufficiently variable to merit distinguishing at least three different types of materials:

1. ***Compact glacial till***- Glacial till that is gravelly loam to silt loam in texture, massive and very dense, hard when dry, and grayish-brown to bluish-gray in color. This material is very common and widespread throughout the Stikine Area. This soil material is stable in place on slopes up to 65 percent.

2. ***Glacial marine till***- This fine-textured glacial till material has a higher content of clay-sized particles and is typically bluer in color than the common compact till. Theory points to it being deposited by the glacier in an underwater environment. Localized areas of water stratified material (some with fossil shell remains), are typical in this material. It is most common at elevations near sea level (0 to 500 feet). Small slumps and slides are very slow to revegetate and are readily apparent on sloping areas, especially those adjacent to or subject to undercutting by stream channels. (This is the hardpan material that underlies most of the muskeg in the city of Petersburg).

3. ***Stratified (laminated) silt, silty clay and very fine sand***- This is the most hazardous blue clay material. It is highly unstable in cut or fill slopes and readily liquifies when disturbed. It is subject to rotational failures in streambanks and cutslopes where the toeslope has been undermined. This material is extensive in the Kake, Sloduc Creek area, but is scattered in small, isolated, low elevation locations throughout the Stikine Area. It is often associated with glacial marine till.

Overlay roads can be constructed on blue clay soils without significant impacts providing cut and fill slopes are not required, such as on gentle slopes.

Soil-dependent road construction on steep slopes, however, can present very serious instability and soil erosion problems, and in this case, could cause serious sedimentation to Duncan Salt Chuck Creek.

Compact till normally requires full bench and end haul, as well as a cutslope angle of 1:1 or less. Road construction should not be attempted on steep slopes of glacial marine till or stratified materials without very unusual and expensive measures such as construction of retaining walls or slope buttressing techniques.

Results of most recent field reconnaissance indicate that despite the potentially serious soil hazard, a mainline road is feasible on either the north or south side of Duncan Salt Chuck Creek. The road can be located on gentle topography which will not require extensive or deep cut and fill slopes in this unstable soil material.

Additional field work, including geotechnical investigation and road location and design, will be performed in order to determine the environmentally preferred location for this road segment.

Table 4-5. Miles of Specified Road Proposed in each Soil Hazard Class.

Soil Hazard	Alternative					
Description	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Low	0	5.4	2.0	9.4	24.3	15.4
Moderate	0	6.4	0	8.8	9.6	9.2
High	0	0	0	0.5	0.2	0.2
Total	0	11.8	2.0	18.7	34.1	24.8

Cumulative Effects

The range of time required for potentially unstable areas to restabilize varies greatly. Some unstable areas can stabilize in as little as three to five years, while others require more time. While some become chronic sources of sediment, any slides or slumps in the analysis area are expected to recover relatively quickly.

Wetlands and Floodplains

Since a high percentage of the Tongass (and about 70 percent of the Bohemia Mountain analysis area) is classified as wetlands, these areas are not considered a scarce resource. Resource values associated with these wetlands vary greatly, depending on the type of wetland, proximity to water bodies, landscape position, and other factors. Alternatives were designed to minimize potential impacts to identified high-value areas, rather than to avoid development on all areas technically classified as wetland.

The potential impact to wetlands is indicated by the amount of forested wetlands proposed for harvest (Table 4-6), and the amount of specified road proposed to be built on areas classified as wetland (Table 4-7). (Data in Table 4-7 refers to specified roads only and does not include temporary spur roads.)

Timber Harvest and Wetlands

Alternatives 5 and 5A would harvest the greatest amount of forested wetlands, followed by Alternative 4 and Alternative 2. Alternative 3 would harvest the least.

Table 4-6. Timber Harvest on Forested Wetlands.

Harvest on Wetlands	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Acres of Forested Wetlands	0	213	6	379	385	385
Percent of Forested Wetlands	0	0.07%	0.01%	1.2%	1.3%	1.3%
Percent of Total Wetlands	0	0.4%	0.01%	0.8%	0.8%	0.8%

Roads and Wetlands

The wetland vegetation, soil drainage or hydric character of a wetland will not be measurably altered by road construction except for the width of the roadfill itself. This is normally about 24 feet wide and amounts to approximately 2.9 acres per mile.

Alternative 3 would result in no road construction on wetlands. Alternative 5 would construct the greatest amount of roads on wetlands followed by Alternative 5A, 4, and 2.

Table 4-7. Specified Road on Wetlands.

Roads on Wetlands	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Miles of Road	0	5.3	0	11.0	22.0	15.0
Acres Covered	0	15.4	0	31.9	63.8	43.5
Percent of Specified Roads on Wetlands	0	45%	0	59%	65%	60%

Floodplains

Executive Order #11988 dealing with floodplains was largely intended to prevent the construction and occupancy of floodplains so that flood events would not destroy property and cause loss of life. None of the proposed timber harvest or road building activity in any of the alternatives would affect any floodplains.

Cumulative Effects

To date, 26 acres of forested wetlands have been harvested, and zero miles of road have been built on wetlands in the analysis area. The additive effects of each alternative is presented in Table 4-8.

Table 4-8. Cumulative Acres of Wetlands Affected

Roads on Wetlands	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Acres Harvested	25.7	239.0	31.6	405.5	411	411
Percent of Wetlands	0.05%	0.5%	0.06%	0.9%	1.0%	0.9%

Fish

It has been extremely difficult to determine specific cause and effect relationships between some forest management practices and variations in salmonid populations. Wild, unmanipulated populations have been found to vary naturally as much as fifty percent due to climatic conditions, escapement, predation, and other variables. Some land management activities can result in masking some effects while compounding others, making it difficult to predict simple causes and effects in order to estimate quantitative changes in fish populations. However, various studies have determined some general and basic needs of the salmonid. These needs require management activities in order to eliminate or reduce adverse impacts on fish populations.

Buffers

The Tongass Timber Reform Act of 1990 prohibits the commercial harvest of timber within a buffer zone no less than one hundred feet in width on each side of all Class I streams and those Class II streams which flow directly into a Class I stream. The maintenance of a buffer zone is a management practice/prescription used to reduce the risk of damage to fish habitat. However, buffers are not without risk themselves, as they are subject to windthrow. Streamside trees that blow over have greater potential to cause even more severe damage to fish habitat than does cutting the trees, depending on channel type and fish species affected. To be effective in moderating stream temperatures and providing a future source of large woody debris, a buffer must be configured to be windfirm. This is often accomplished by locating the length of the buffer parallel to the prevailing direction of storms and/or extending the buffer to a windfirm topographic boundary. The trees left standing along the streams provide the following:

- stability of the stream banks,
- a continuing source of large woody debris available for stream habitat maintenance,
- shade for surface water to protect it from extreme temperature increases that may kill fish,
- a source of needles, leaves, litter, and insects as a nutrient base in the food chain.

Risk

Consequences are measured by the degree to which there is a potential for damage to, or loss of, the resource. Guidelines for managing stream resources for fisheries protection are provided in the *Region 10 Aquatic Habitat Management Handbook (FSH 2609.24)* which provides state-of-the-art guidance for developing riparian management presciptions. These prescriptions minimize water quality degradation and, subsequently, the risk to fisheries which would be presented by implementation of any of the action alternatives. Class I and II streams are covered in the Handbook, as are Class III streams that do not contain fish populations but are important because of their effect on downstream water quality. In addition, recognized prudent management activities or Best Management Practices (BMP's) are employed. (Refer to *Region 10 Soil and Water Conservation Handbook, FSH 2509.22.*) This will eliminate some direct and indirect effects and will reduce the risk of other indirect effects to the greatest extent practicable within the context of management goals as defined by law, regulation, and administrative decision.

If these guidelines are followed, no measurable effect is anticipated and there will be no habitat-related reduction in the fish population. However, there is a possibility that the trees remaining in each Aquatic Habitat Management Unit (AHMU) will blow down. This possibility is considered when determining the timber harvest's potential impact on fish. Probability, in turn, is related to the number of miles of stream requiring AHMU prescriptions and whether or not both sides of the stream would receive impact. Table 4-9 displays the miles of stream relative to each alternative which will require Class I, II, or III AHMU prescriptions.

Table 4-9. Miles of Stream Requiring Class 1, Class 2, and Class 3 AHMU Prescriptions.

AHMU CLASS	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Class 1: 1 side	0	0.88	0.78	1.25	2.48	2.02
Class 1: 2 sides	0	0	0	0.45	0.45	0.45
Class 2: 1 side	0	0.55	0.55	0.85	1.40	1.40
Class 2: 2 sides	0	0.93	0.30	0.63	0.93	0.93
Class 3: 1 side	0	3.08	2.15	2.05	4.20	4.20
Class 3: 2 sides	0	0.90	0.35	1.75	2.10	2.10
Total: 1 side	0	4.51	3.48	4.15	8.08	7.62
Total: 2 side	0	1.83	0.65	2.83	3.48	3.48
Total: 1 and 2 sides	0	6.34	4.13	6.98	11.56	11.10

Crude measures of ***relative***, not ***absolute***, risk to fisheries include total length of roads, total length of buffered and unbuffered stream channel, total number of stream crossings, and total acres of harvest within fish stream watersheds. Combined, these relative risk factors provide a means of comparing development alternatives with regard to potential impact on fisheries. These factors are displayed in Table 2-1 in Chapter 2.

Knutson-Vandenberg Act

Provision is being made under the Knutson-Vandenberg Act (KV) during timber sale planning to make funding available for fisheries enhancement projects. A fish barrier on Duncan Salt Chuck Creek and an egg box site on stream 110-16-006 are potential improvements that await further study and possible funding under this Act.

Cumulative Effects

An increase in sport fishing pressure can be expected while the camp is in Portage Bay and/or Hamilton Bay near Kake. Increased access provided by establishing a road system would probably result in a slight increase in levels of sport fishing within the analysis area during and after completion of the sale. Any proposed stream improvements would increase fish production over the long term.

Wildlife Habitat Maintained

A total of 1,131 acres would be maintained for wildlife habitat in this analysis area under current Forest Plan direction. In addition to the standards and guidelines of Forest Plan and Regional Guide, the National Forest Management Act directs that viable populations of existing native and desired non-native vertebrate species will be maintained and well-distributed throughout the planning area. Alternatives 1 and 5A comply with this direction, based on numbers and distributions of the selected management indicator species available from an interagency task force. The task force was charged with determining the minimum populations needed to meet the requirements of the Act. (Refer to the planning record for minimum viable population requirement analysis by ADF&G Wildlife Analysis Areas.)

Because the Forest Plan is currently being revised, standards and guidelines proposed for managing wildlife habitat are also being revised. One of the more significant changes is the recognition of the value of retaining large, appropriately distributed blocks of old growth forest. The Tongass Land Management Plan Revision proposes several indicator species that are sensitive to forest fragmentation and may require minimum patch sizes to provide optimum habitat.

Threatened and Endangered Species

Humpback whales and sea lions inhabit Frederick Sound adjacent to the analysis area. However, activities associated with this timber sale area are not anticipated to have any effect on these marine mammals. There are no other listed animals or plants known to frequent or occur in the vicinity of the analysis area. Therefore, this sale should have no adverse impacts on any threatened or endangered species.

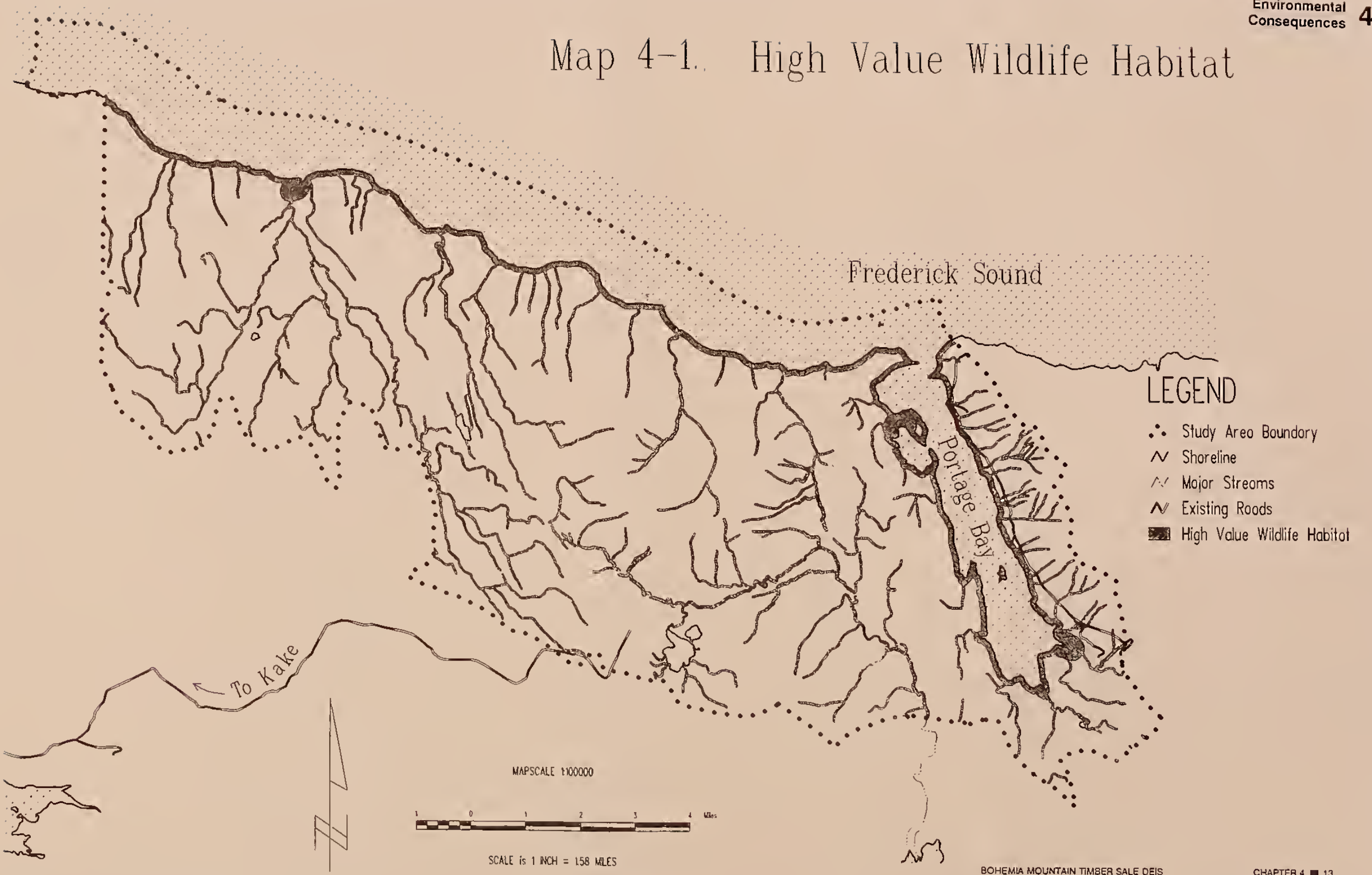
Wildlife

Three measures of consequences were analyzed and displayed by alternative to address the environmental effects of the five action alternatives which propose various levels and designs of timber harvest.

Consequence A: Proposed acres harvested and miles of road constructed by type of wildlife habitat. The wildlife models used for this analysis assume the highest quality habitat, in order of priority for all species combined, to be estuary, beach fringe, riparian and general forest.

Consequence B: The effects of implementing the various alternatives on wildlife habitat capability expressed by numbers of management indicator species that the analysis area is capable of supporting following alternative implementation.

Map 4-1. High Value Wildlife Habitat



Consequence C: Number, size and distribution of old-growth habitat blocks that remain after implementation as an expression of old growth species viability, ecosystem productivity and plant and animal biodiversity. Old-growth-dependent species are those species which require old-growth forest for survival and reproduction.

Display of Consequences

Consequence A - Effect of road construction on habitat: The Habitat Capability Models together with field surveys and a review of historical data and reports were used to determine the most valuable and productive wildlife habitat for the widest diversity of wildlife species. Acres allocated in the Tongass Land Management Plan to be deferred from harvest and maintained for wildlife habitat were selected. Habitats selected to be maintained include a 1,000-foot buffer around all estuaries, a 500-foot buffer strip along all beach fringe, and a minimum wind firm buffer of not less than 100 feet in width on each side of all Class I streams and all Class II streams flowing directly into Class I streams. (See Map 4-1)

Table 4-10 displays the number of acres proposed for harvest by wildlife habitat type for each alternative. No harvesting is proposed in the two most valuable habitats, estuary and beach fringe. A maximum removal of 41 acres out of roughly 9,000 acres identified as high value wildlife habitat is proposed in Alternatives 5 and 5A. All proposed alternatives would leave nearly seven to eight times the minimum requirement of 1,130 maintained acres of high value habitat.

Table 4-10. Summary of Acres Proposed for Harvest by Alternative

	Alt. 1	Alt.2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Estuary	0	0	0	0	0	0
Beach Fringe	0	0	0	0	0	0
Riparian	0	9	9	32	41	41
Forest	0	965	375	1008	1594	1415

Displayed in Table 4-11 are the miles of road proposed by alternative in the four defined habitats. While the analysis of consequences are more subjective and not as easily addressed, the potential effects of disturbance and habitat alteration need to be displayed. Of particular concern are the effects of roading in or adjacent to the valuable waterfowl estuary at the south end of Portage Bay (Alt. 5).

Table 4-11. Miles of Road Proposed for Construction by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Estuary (miles)	0.0	0.0	0.0	0.0	0.5	0.0
Beach Fringe (miles)	0.0	0.0	0.0	0.0	0.0	0.0
Riparian (# crossings)	0	9	0	2	30	21
Forest (miles)	0.0	13.0 (north) 17.2 (south)	1.9 (either)	21.1 (north) 24.3 (south)	34.2 (north) 37.5 (south)	23.5 (north) 26.7 (south)

Consequence B - Effect of timber harvest on habitat: The consequences of timber harvest on selected wildlife indicator species were analyzed with the use of computer-generated habitat suitability models developed for the Tongass Forest Plan Revision. The model outputs were field verified for accuracy during the summer of 1990 and corrected where field surveys showed obvious errors or omissions. Generally, the model outputs seemed to reflect habitat capability and use, with the exception of two cases: 1) a deer wintering habitat that was lower than historically documented and was located along the Frederick Sound shoreline, and 2) a failure to display habitat capability and use by river otter of inland rivers and streams, particularly the reach of Duncan Salt Chuck Creek between the Salt Chuck and Bohemia Lake. Corrections were made to incorporate these field observations into the analysis.

Consequences addressing the effects are displayed for four periods in time: first, prior to 1954, to indicate habitat capability before any significant timber harvest; second, 1990, to display the current condition; third, 1991-2015, to display effects of implementation for all alternatives for the next 25 years; and fourth, 2091, or 100 years following implementation, to display cumulative effects through the 100-year timber management rotation. This is in recognition that lands within the analysis area, with the exception of VCU 441, are allocated to timber production (LUD IV) and will be harvested within prescribed guidelines by the end of the planned rotation.

Figures 4-1 through 4-5 display the consequences of alternative implementation on habitat capability for Sitka blacktailed deer, marten, black bear, river otter and bald eagle.

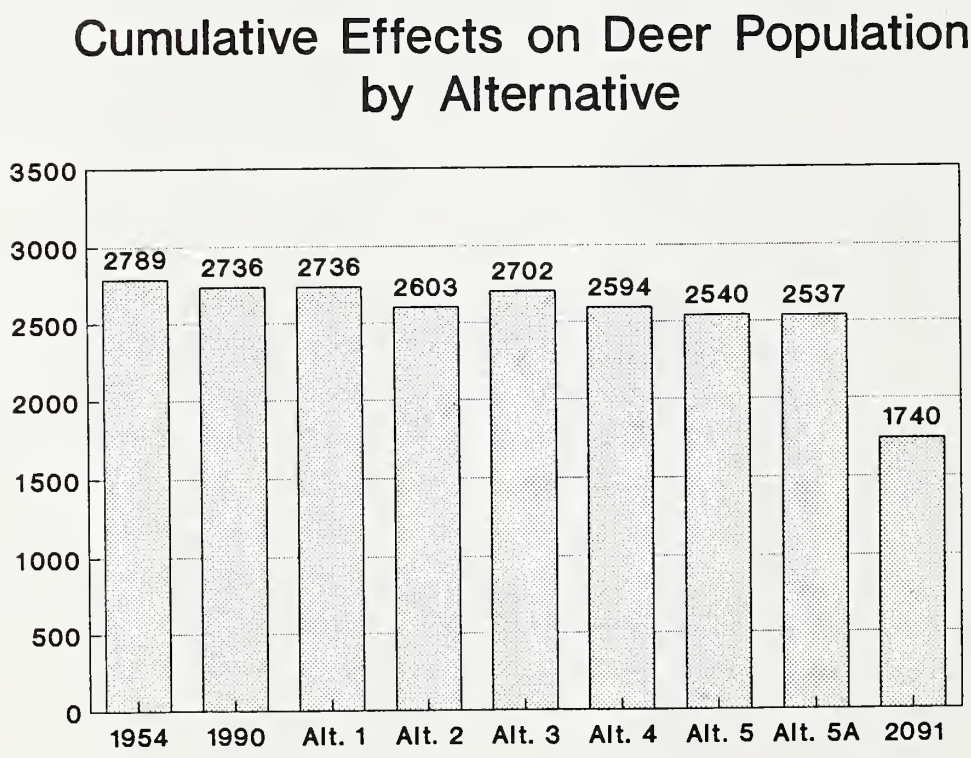


Figure 4-1. Effects on Potential Deer Population, by Alternative

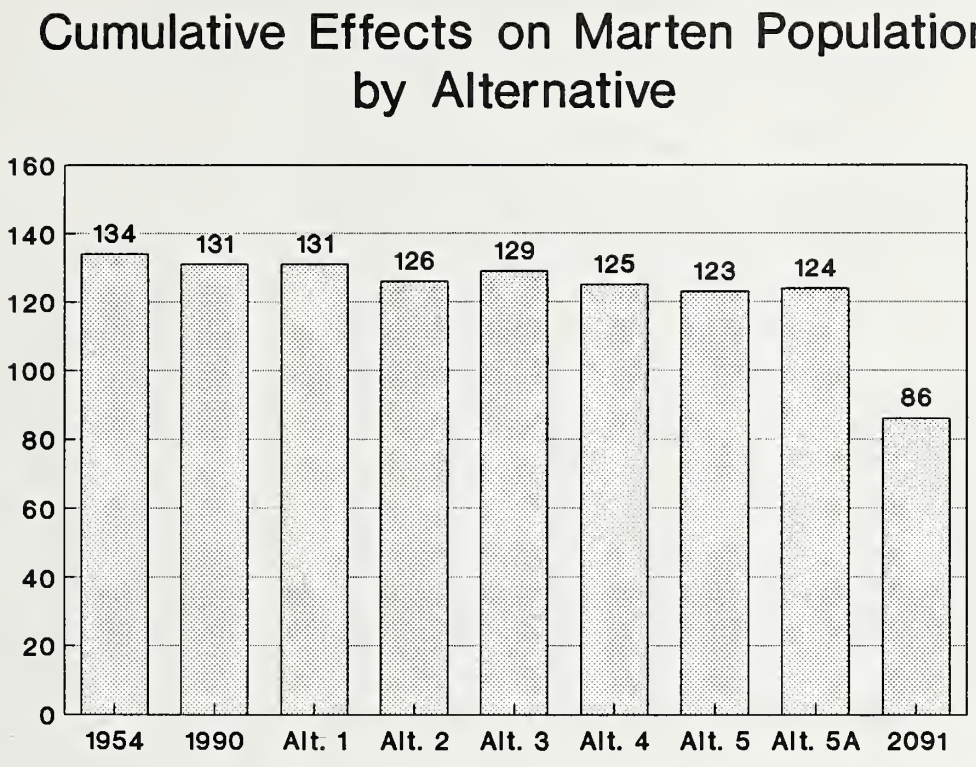


Figure 4-2. Effects on Potential Marten Population, by Alternative

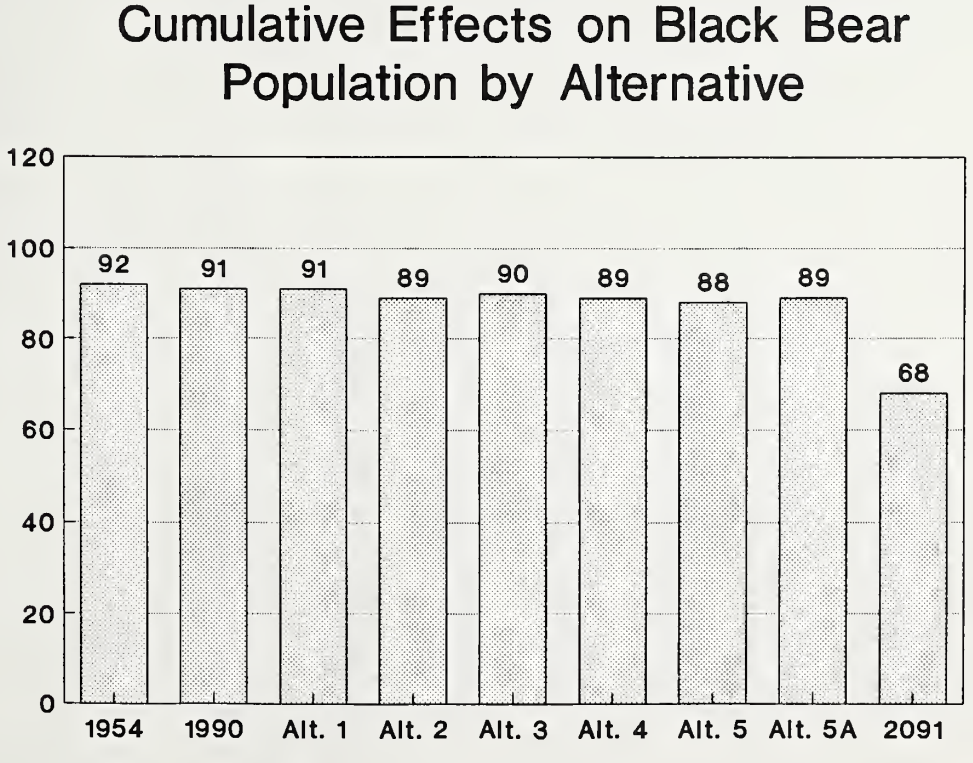


Figure 4-3. Effects on Potential Black Bear Population, by Alternative.

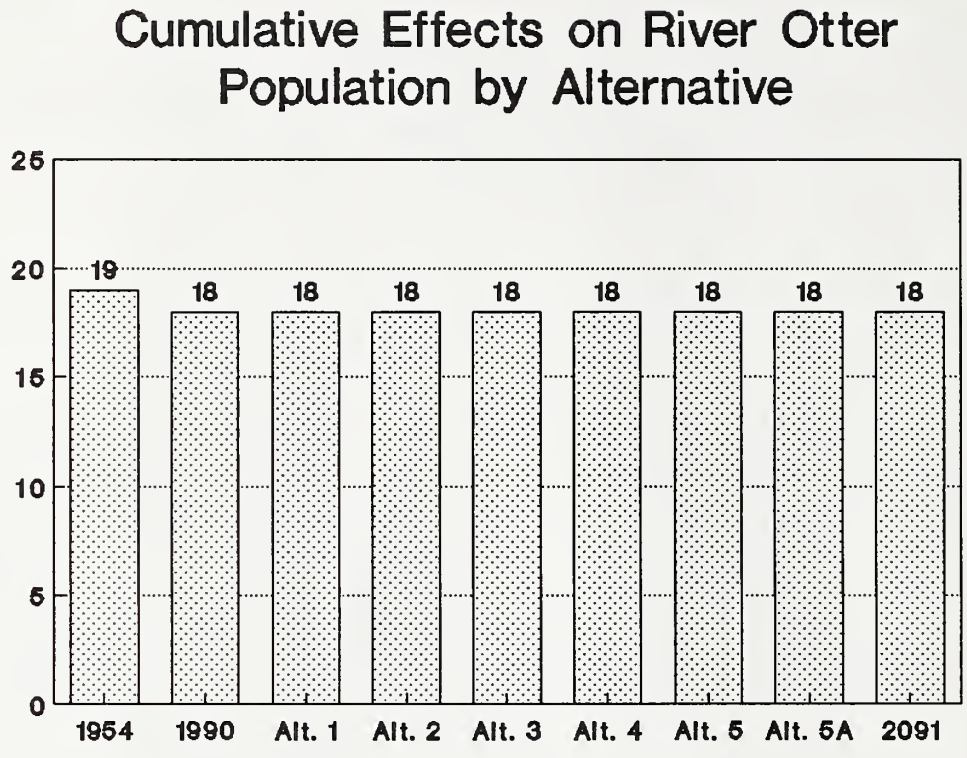


Figure 4-4. Effects on Potential River Otter Population, by Alternative

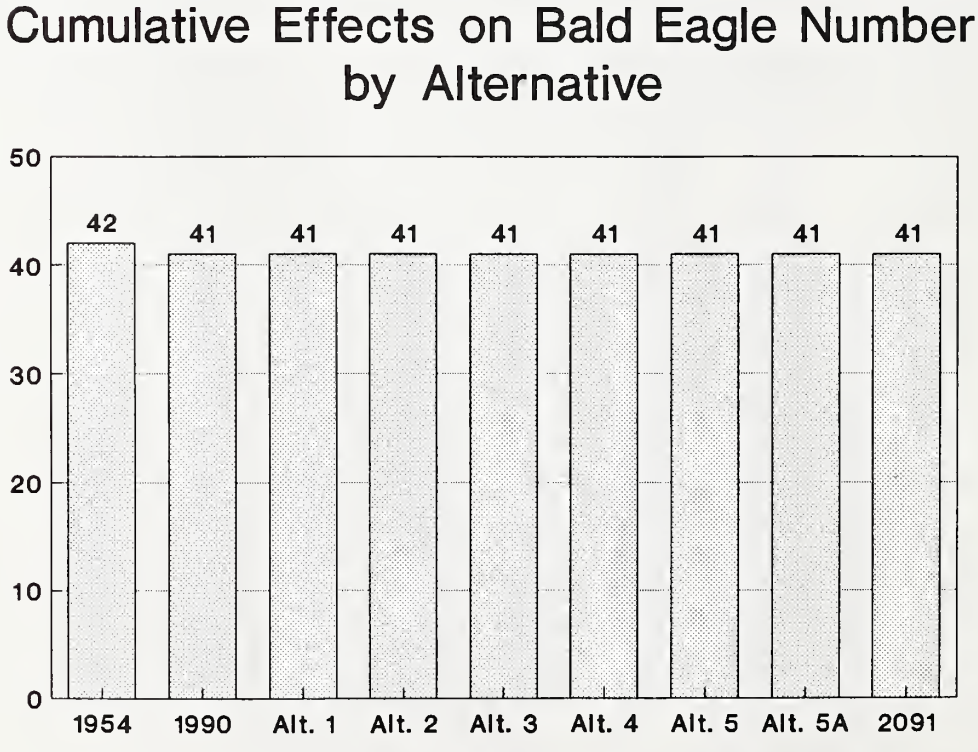


Figure 4-5. Effects on Potential Bald Eagle Numbers, by Alternative

Consequence C - Old Growth Patch Size. Table 4-12 displays estimates of minimum old-growth patch size necessary to provide optimum habitat effectiveness for proposed management indicator species thought to be sensitive to habitat fragmentation. (Analysis of the management situation, Tongass National Forest Land and Resource Management Plan Revision R10-MB-89)

Table 4-12. Estimates of Old Growth Patch Size for Selected Species

Management Indicator Species	Minimum Patch Size for Optimum Habitat (Acres)
Sitka black-tailed deer	1000
Brown creeper	15
Hairy woodpecker	500
Red breasted sapsucker	250
Pine Marten	180
Red Squirrel	30
Goshawk	2500
Marbled Murrelet	600

As part of the effects analysis, changes in management direction such as old growth block size and distribution were considered, even though proposed management activities will continue under the direction of the current Forest Plan until the Revision is completed. This proposed timber harvest is consistent with current Forest Plan direction and is scheduled to be offered for sale prior to the completion of the revised plan.

On the Tongass National Forest, several management indicator species proposed for the revision of the Forest Land Management Plan appear to be sensitive to forest fragmentation caused by timber harvest and may require minimum patch sizes for optimum habitat (refer to Table 4-10). In addition, several other species, including the northern goshawk and marbled murrelet, are believed to be dependent on large blocks of undisturbed old growth forest.

Individual drainages and large contiguous forest blocks within the Bohemia Mountain analysis area represent unique functioning ecosystems. Existing and proposed harvest units, large muskegs, subalpine habitat and shorelines were used as boundaries to define existing and remaining forest blocks following alternative implementation. A minimum size of 1,000 acres comprised of older age class timber (volume class 4 and above) was selected to represent forest blocks meeting the habitat requirements of dependent species. For comparison purposes, the greater the number and size of well-distributed forest blocks, the greater the opportunity for species viability and ecosystem biodiversity for most southeast Alaska plant and animal communities.

Average remaining forest block size varies considerably by alternative from the existing condition, as shown in Table 4-13. The long term cumulative effects over the 100-year rotation would vary far less, assuming harvest projections in the current Forest Plan. However, in the near term, maintenance of large old-growth blocks retains options and provides greater flexibility for future planning efforts.

Table 4-13 displays consequences on large "old-growth forest" block size and distribution by alternative. Due to the large percentage of snags in the current stand component and the green tree retention proposed in all alternatives, snag availability and replacement will not be an evaluated consequence.

Table 4-13. Older Age Class Forest Blocks Remaining by Alternative

Alt.	# of Blocks	Location	Acreage	Avg. Block Size
1	4	N. Bohemia Mtn. Duncan River Upper Portage S. Bohemia Mtn.	7,020 1,040 1,380 2,244	2,921
2	3	North Bohemia Duncan River Upper Portage	7,020 1,040 1,230	3,097
3	4	North Bohemia Duncan River Upper Portage S. Bohemia Mtn.	7,020 1,040 1,230 2,244	2,884
4	3	North Bohemia Duncan River Upper Portage	4,488 1,040 1,380	2,302
5,5A	3	North Bohemia Duncan River Upper Portage	4,488 1,040 1,230	2,252

Subsistence

This section evaluates whether or not there is a significant possibility of a significant restriction of subsistence use in the Bohemia Mountain analysis area.

ANILCA Section 810 Subsistence Evaluation

The Alaska National Interest Lands Conservation Act (ANILCA), Section 810, mandates that Federal agencies having jurisdiction over lands in Alaska evaluate the potential effects of proposed activities on subsistence uses and needs. Section 810 of ANILCA specifies:

In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the agency having primary disposition over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be affected until the head of such federal agency:

1. *gives notice to the appropriate state agency and appropriate local committees and regional councils established pursuant to ANILCA Section 805;*

2. *gives notice of, and holds, a hearing in the vicinity of the area involved; and*

3. *determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action.*

A number of Environmental Assessments (EA) and Environmental Impact Statements have been produced within the immediate and surrounding Bohemia Mountain analysis area. Apparently no previous subsistence evaluations were included as part of the National Environmental Policy Act (NEPA) process. The Federal District Court, in *Hanlon vs. Barton*, directed the Forest Service to consider cumulative impacts to subsistence resources and users of past, present, and reasonably foreseeable future activities when conducting ANILCA Section 810 evaluations.

This portion of the evaluation examines the proposed action alternatives for the analysis area and whether there could be an affect upon the subsistence resources utilized by the above communities. Categories evaluated here are deer, furbearers, waterfowl, and black bear. The effects of proposed alternatives are evaluated by (1) changes in abundance or distribution of subsistence resources, (2) changes in access to subsistence resources, and (3) changes in competition from non-rural users of subsistence resources. This process determines whether subsistence uses within the analysis area or portions thereof would be significantly restricted by any of the proposed alternatives.

In order to determine this, the evaluation does the following:

1. Considers the availability of subsistence resources in surrounding areas;

2. Considers the cumulative impacts of past, present, and reasonably foreseeable future activities on subsistence resources and users;

3. Looks at potential socio-cultural and socio-economic implications affecting subsistence users; and

4. Focuses on the important, mapped subsistence use areas within the analysis area.

This evaluation relies on the use of wildlife habitat capability models, ADF&G hunter survey data, and the Tongass Resource Use Cooperative Survey (TRUCS) questionnaire and mapped data.

Three rural communities (Kake, Petersburg, and Wrangell) have documented use of the various subsistence resources within the analysis area. The TRUCS (1987-8) revealed the average pounds harvested per person for these three communities was: 160 pounds for Kake, 165 pounds for Wrangell, and 203 pounds for Petersburg (see Chapter 3).

Deer

In 1987, the Alaska Department of Fish and Game (ADF&G) Hunter Survey asked about specific numbers of deer desired for harvest for a season in order to be considered successful and numbers actually harvested. The Alaska Board of Game closed much of northern portions of Game Management Unit (GMU) 3, in 1975, to all deer harvest. In recent years there has been no documented deer hunting throughout northern GMU 3. This would suggest that those households/communities utilizing the northern portions of GMU 3 have shifted their deer harvesting to other nearby islands, i.e., portions of Admiralty, Baranof, Chichagof, and Prince of Wales Islands.

As many as 37 proposed timber harvest units are being considered in Alternative 5 and slightly fewer units in the other action alternatives. Several units are within the important deer subsistence use areas. The projected effects to deer resulting from timber harvesting of these units are evaluated in the Wildlife section of this document. The effects are evaluated even though the deer population on Kupreanof Island is currently below a huntable level according to the Alaska Board of Game. The projected effects on habitat capability in the analysis area ranged from no effect to a maximum of 36 percent reduction for the 100-year rotation.

Furbearers

The trapping of furbearers takes place within the analysis area, as indicated by harvest records from the Alaska Department of Fish and Game. A number of proposed harvest units are potentially within important furbearer habitat/subsistence use areas. The numbers of users and their success within this analysis area calls into question trapping as a significant source of subsistence to the communities and households having documented use of VCU 424, 441, and 442. Past, present, and reasonably forseeable projections, based on predictive modeling, indicate a decline in the pine marten habitat capability from 134 animals in 1954 to 86 in 2091. This represents a projected reduction of from no effect to a 35 percent reduction.

Waterfowl

A variety of waterfowl are hunted from Portage Bay, segments of the sheltered southshore of Frederick Sound, and a number of unnamed small inland lakes (refer to the Wildlife section 3-22).

The wildlife section concluded that the proposed alternatives would have a minimal effect on the wetlands within the analysis area.

Black Bear

In Chapter 3 it was reported that Kupreanof Island is an important area for the sport and subsistence taking of black bear. The Portage Bay shoreline is an especially valued area. Habitat modeling data suggest that black bear numbers will decline markedly during the 100-year forest rotation period. However, when viewing the various wildlife alternatives for this planning period, the effects would be none to minimal.

Access

Alternative 1 would maintain the unroaded character of the Bohemia Mountain analysis area. Access would remain by foot, boat, or floatplane. Alternative 5 would provide 28.1 (north route) or 31.4 (south route) miles of permanent, specified road that would improve access to subsistence resources. Alternative 5A would provide 19 or 22.2 (north and south repectively) miles of specified road, Alternative 4 would provide 18.3 (north) or 18.3 (south), Alternative 2 would provide 9.9 (north) or 14.1 (south), and Alternative 3 would provide 0.5 miles either route.

Changes in Competition From Non-Subsistence Users

During the life of the timber sale, it is likely that an avearage of 60 people will live and work out of a camp near Portage Bay or Kake for up to five years. Some residents of the camp may meet residency requirements and qualify as subsistence users, and all residents could purchase sport hunting and fishing licenses. There is likely to be an increase in use of subsistence resources by camp residents; however, the lack of subsistence use in the area at this time suggests there are few subsistence users with whom camp residents could compete. Consequently, no increase in competition is anticipated.

Abundance and Distribution

The harvest of timber in the area would potentially reduce the amount of habitat available for a number of subsistence species. However, effects appear to be minimal.

Deer

Based on predictive modeling and other subsistence sources, it would appear that deer populations will not be greatly affected by any of the proposed action alternatives (see Figure 4-1).

Furbearers

Hunting and trapping of subsistence species within the analysis area appears minimal. Action alternatives project zero to minimal impacts to furbearers.

Waterfowl

The proposed action alternatives will have zero to minimal impacts on the abundance and general distribution of waterfowl. All alternatives are well removed from any potential conflicts with waterfowl.

Black Bear

Action alternatives are projected to have minimal impact on black bear habitat. Furthermore, roading and harvesting of timber are expected to have similar results on their abundance and distribution.

Salmon

Changes in the salmon population are not anticipated in any of the action alternatives. All proposed cutting units near existing or potential salmon spawning and rearing streams are protected by no-cut and transition buffers as defined in the AHMU Handbook. Thus the impact on salmon harvest for subsistence use would be negligible.

Other Finfish

The action alternatives are projected to have no impact on other finfish habitat. Therefore the subsistence use would not be affected.

Marine Mammals

The small population of harbor seals that uses Portage Bay and the surrounding waters may be temporarily displaced by water-based logging activities. This would only occur during the three to five years of sale activity. Since there is no documented harvest of marine mammals in the Portage area, the impact of this sale on subsistence use is expected to be low and temporary.

Cumulative Effects

The life of the sale plan (analysis) projects that a total of 13,739 acres of timber may be harvested from the VCU's in the analysis area by 2091. Under the Tongass Land Management Plan (TLMP) prescriptions, the analysis area has 67,689 acres available, based on a 100-year forest rotation. The wildlife and fisheries sections project this level of harvest would affect the habitat capability of a number of wildlife species, but should not affect salmon habitat capability. The changes in habitat capability will have minimal to no effects on abundance and distribution.

Hunting and Trapping

Access to the Bohemia Mountain analysis area would be improved as a result of roads associated with a timber sale and there would probably be an increase in the extent to which the area was used for hunting and trapping. Sitka blacktailed deer season has been closed since 1975 and would not be affected. However, the potential for increased take of illegal deer may be increased. Black bear will continue to be hunted. This may result in a reduction in these populations.

Cumulative Effects

The Habitat Suitability Index (HSI) model predicts that over the 100-year rotation the deer population could be reduced from 2,736 to 1,740 animals. The HSI model predicts that the marten population could be reduced from 133 to 68 animals over the 100-year rotation, the black bear population could be reduced from 91 to 68, and the river otter and the bald eagle populations would remain constant.

Recreation

In discussing the primary issue, the Portage Mountain Trail and the Petersburg Creek-Duncan Salt Chuck Wilderness, the impacts are described in terms of changes to the setting, using the Recreation Opportunity Spectrum (ROS) system. The east segment refers to the segment of trail from Portage Bay to Petersburg Lake, outside of the Wilderness. The west segment refers to the trail from Portage Bay to Duncan Salt Chuck, outside the Wilderness.

Trail & Wilderness

Of the six action alternatives, Alternative 5 is the only one which would directly affect the Wilderness. In the setting itself, about 160 acres would change from a designation of "semi-primitive nonmotorized" (SPNM) to "roaded modified" (RM). The east segment of the trail would be affected less than the west segment. It is located about ½ mile north of the Wilderness boundary, and will likely change from SPNM to RM. This possibility will need field verification. Shaping units or trees left behind during layout and design might achieve a "roaded natural" (RN) setting. The majority of the trail corridor changes to RN from "semi-primitive modified" (SPM) and "semi-primitive nonmotorized" (SPNM), due to a road crossing the trail. (The breakdown of the trail then, will be approximately ½ mile = RM, 1 ¼ mile = RN, and ¼ mile = SPM.) During harvest activities, most of the east segment will be in a "roaded modified" setting.

The west segment of the trail would have a road crossing, which would bring about the change to RN from SPM/SPNM for most of the trail corridor outside the Wilderness.

General Setting Impacts

This section describes changes to the existing recreation opportunity settings, using the ROS system. The changes are summarized first, then the implications discussed.

Table 4-14. Expected Impacts on the ROS Settings Relative to the Action Alternatives

Alternative	Portage Bay	Bohemia Mountain
1	No change	No change
2	East and southeast Portage Bay; increase in Roaded Modified from Semi-Primitive Motorized area above existing units.	Bohemia Mtn.; large reduction in primitive core, resulting in Roaded Modified on south side of Bohemia Mtn. The primitive core on the north side and to the south of Bohemia Mtn. changes to semi-primitive nonmotorized.
3	East and southeast Portage Bay; same as Alternative 2.	Bohemia Mt.; No change from existing setting.
4	East and southeast Portage Bay; No change from existing setting.	Bohemia Mtn.; Largest reduction in primitive core, similar to alternative 2. Roaded Modified increased on the north side of Bohemia Mountain from semi-primitive and primitive settings. The only primitive setting remaining in the analysis area would be the muskeg flats on the west side.
5	In addition to impacts in Alternative 5A, a Roaded Natural corridor would exist, from semi-primitive settings. This would split the semi-primitive settings north of the road from those south of the road.	
5A	East and southeast Portage Bay; same as Alternative 2.	Bohemia Mtn.; same as Alternative 4.

ROS Changes

The changes in settings, including those within the Wilderness are all consistent with Forest Plan direction. It is general policy that Wilderness areas contain their own buffer. No unique or important values would be foregone, except for the changes to the trails described below and minor changes in Wilderness settings.

Most of the recreation places would remain in their existing settings. Those that do change would not have a great impact on the activities associated with them, except as noted below by alternative.

Alternatives 2, 4, and 5A provide additional roaded access for the residents of Kake for activities such as gathering forest products, driving for pleasure, and hunting. These opportunities do not appear to be in short supply for Kake. The new opportunities created will involve a lengthy day trip from Kake, and thus recreation use is expected to be light. Potential opportunities at Bohemia Lake would be maintained in the existing setting under all alternatives.

Alternative 5 provides additional access to recreation opportunities such as hunting, fishing, boating in Portage Bay, and hiking. It would provide access to the Portage Mountain Trail and the Petersburg Creek-Duncan Salt Chuck Wilderness. As previously acknowledged, this would be the only Wilderness in southeast Alaska accessible by road, a feature that could be used as a promotional tool for tourism. Either way, increased use of the Wilderness can be expected. The currently low number of social encounters in this portion of the Wilderness is likely to increase. The trails would likely begin to show increased damage, as users break through the muskeg mantle of this unimproved trail. This would need to be monitored over time. If the damage was unacceptable, the trail would need to be hardened with planking, relocated, or have use restricted. This would depend on the objectives for this section of the Wilderness, and the amount of use, which is expected to be light, given the distance from Kake.

Alternative 5 might have the greatest impact to future opportunities for the City of Kupreanof to develop "cottage industries" associated with use of the trails and Wilderness. It would also affect existing users by decreasing the possibility for solitude and interrupting the contiguous semi-primitive settings, making them into areas with road crossings and evidence of harvest activities. The users would either be displaced, or adjust to the changes. This impact might be lessened with road closures, scheduling harvest activities adjacent to the trail in as few operating periods as possible, and/or constructing a short (2-3 miles) segment of trail to tie together the two segments of the Portage Mountain Trail in the vicinity of the Wilderness boundary. This would give users the option of avoiding the road crossing and maintaining a contiguous semi-primitive setting. Users could also reach Portage Bay as an attraction or destination if they chose to cross the road.

Cumulative Effects

All of the action alternatives would provide greater access to the area and shift the nature of the recreation experience from "primitive" to "roaded natural" and "roaded modified." The area would probably be used more than in the past for recreation purposes. Those visitors seeking a primitive or semi-primitive setting could be displaced.

Wild and Scenic Rivers

Alternatives 1, No Action, and Alternative 3 are the only alternatives that would fully protect Duncan Salt Chuck Creek in its tentatively eligible status for wild classification, and possible designation and inclusion in the National Wild and Scenic River System for the entire 12 miles of the eligible portion of the stream. For analysis, two river segments were considered: Segment 1, from the falls at the outlet of the Salt Chuck upstream to the Wilderness boundary, and Segment 2 from the Wilderness boundary upstream to Bohemia Lake. A detailed description of the suitability report for Duncan Salt Chuck Creek is included as Appendix E in this Draft EIS.

Designation

Wild

Segment 1, 3.9 miles within the Wilderness, could be designated as a wild river and not affect any of the action alternatives. Segment 1 lies outside the analysis area boundary and is not affected by the proposed action.

Segment 2, if designated as a wild river, would affect the implementation of proposed action Alternatives 2, 4, 5, and 5A. Designation of Segment 2 as a wild river would have the following effects:

1. Withdrawal from mineral entry; the absence of existing claims or known mineral resources indicate the withdrawal would likely have no significant effect on the availability of mineral resources,
2. Denial of the opportunity for future construction of a State highway connecting Kake and Petersburg within an existing identified corridor. Alternate routes, if available, would likely have higher maintenance and user costs and could increase impacts on soil and water resources,
3. No likely effect on future availability of water supplies or electric power since the area has no identified potential for power development and no existing power site withdrawals,
4. Increased access cost to timber resources on the Bohemia Range north and west of the river corridor and possible denial of access to timber on the west side of Portage Bay from the Hamilton Creek road,
5. Elimination of potential harvest on approximately 947 acres of suitable forest lands within the river corridor (1.57 MMBF); potential fish habitat enhancements could have higher costs associated with access and design, or development could be precluded,
6. Maintenance of current access and competition for subsistence resources,
7. Maintenance of the current primitive/semi-primitive recreation opportunities, and
8. Preservation of the unmodified landscape within the river corridor. Visual quality outside the river corridor could be managed in accordance with adjacent land use designations, and the visual quality objective for these adjacent lands would allow timber harvest and other activities to dominate the landscape.

Scenic

Segment 1: Designation of Segment 1 as a Scenic River would have no effects on the action alternatives since it is less restrictive than a Wild River designation which had no effect. Segment 1 lies within the Petersburg Creek-Duncan Salt Chuck Wilderness and is outside the analysis area.

Segment 2: If Segment 2 is designated as a scenic river, all of the proposed action alternatives, 2, 3, 4, 5, and 5A could be implemented. Designation as a scenic river would have the following effects:

1. It would allow for the future construction of the State highway on the planned location, with two road bridges across the river,
2. The future availability of water supplies or electric power would not be affected,
3. Segment 2 would remain open to mineral entry,
4. It would allow restricted timber harvest on 947 acres of suitable forest land; harvest activities would utilize silvicultural treatments which would ensure compatibility with visual objectives for a Scenic River designation,
5. It would allow typical fish enhancement projects, increasing the potential for increased fish production,
6. It could increase access for some subsistence uses and enhance semi-primitive and roaded recreation opportunities,
7. It would retain the visual character within the corridor as seen from the river, while adjacent areas are subject to visual quality objectives of the land use designations.

Non-designation

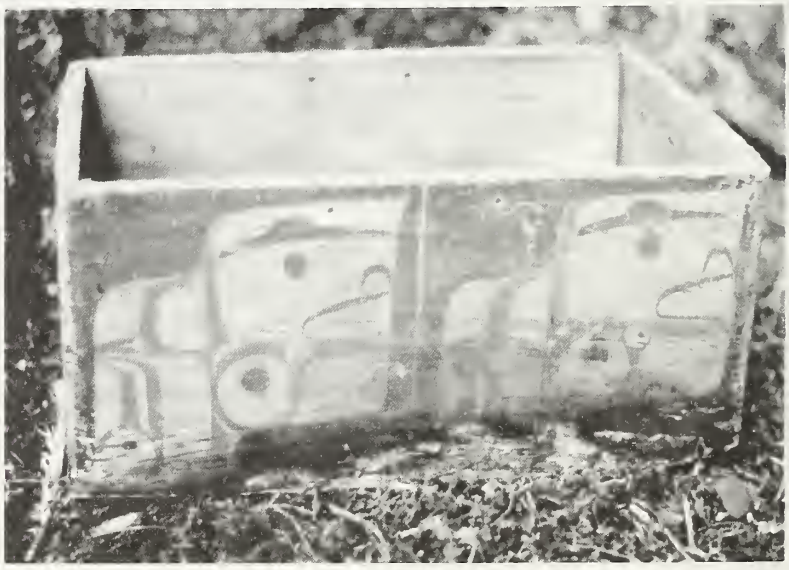
Segment 1: Outstandingly remarkable fisheries, wildlife, scenic, and recreational values, concentrated in the Wilderness and already protected from commodity-oriented management activities, would not be adversely affected if the river were not designated.

Segment 2: Timber harvest on lands adjacent to the river corridor would likely be visible from the corridor; however, since scenic values were not outstandingly remarkable in Segment 2, river values are not affected. The stream side buffers required by the Tongass Timber Reform Act and the application of the Best Management Practices adequately protect fish habitat and sport fishing values. Harvest of timber in Segment 2, subject to standards and guidelines, would reduce the primitive character of the area and may increase access for recreation and subsistence uses.

Cultural Resources

Cultural resource sites within the Bohemia Mountain analysis area may contain significant information on past environmental conditions and human lifeways, possibly including information related to past conditions along the north Pacific Rim. These sites are both fragile and non-renewable. Primary impacts can include alteration to the settings of sites; alterations of above ground objects, features and structures; as well as the spatial relationships among them; and disturbance or destruction of subsurface cultural deposits. Secondary impacts may include a higher frequency of site vandalism due to increased access from constructed roads.

Federal laws and regulations (particularly the National Historic Preservation Act of 1966, as amended; Executive Order 11593, "Protection and Enhancement of the Cultural Environment"; the Archaeological Resource Protection Act of 1979, as amended; and the American Indian Religious Freedom Act of 1978) require a process, specified in 36 CFR 800, for considering the impacts of Federal projects on cultural resources. In brief, this process, outlined in Section 106 of the National Historic Preservation Act, involves inventorying cultural resources, determining which are significant or eligible to the National Register of Historic Places, evaluating project effects, and designing and implementing measures to negate any adverse effects that projects may have upon significant resources. The process is undertaken in consultation with the Alaska State Historic Preservation Officer (SHPO) and possibly the Advisory Council on Historic Preservation.



The known sites in the analysis area are surrounded by buffers and will not be affected. It is more difficult, however, to predict the effects on sites that have not yet been identified. It is well documented that sea levels in the islands of southeast Alaska fluctuated throughout time. It is also apparent that the seashore and coastal environment was the focus of the activities of the people who have inhabited the area. Therefore, it appears as though past sea levels play an indicator role in locating aboriginal sites and that the key criterion for establishing probability zones for cultural resources is elevation above the present shoreline.

The current Forest-wide predictive model for cultural resources considers slope angle and elevation as the two primary environmental factors for establishing a high, medium or low probability for discovery of cultural resources. The elevation and slope angle figures used to delimit the probability zones are general guidelines. The high probability zone is defined as all areas between sea level and 100 feet in elevation. The medium probability zone is defined as all areas between 100 and 1,000 feet in elevation, with slope angles of 30 percent or less. The low probability zone is defined as all areas between 100 and 1,000 feet with slope angles greater than 30 percent; all areas above 1,000 feet in elevation, regardless of slope angle; and muskeg areas. Normally, areas of high and medium probability will require a field inventory to identify significant sites, but it may be possible to recommend clearance on the basis of the results of a literature and files search.

Raven's Wrinkled Foot: A Cultural Resource Overview of Kupreanof Island (Rabich-Campbell 1988) presents a different cultural resource predictive model based on the results of a literature search and an examination of known and reported sites. The highest recorded site on Kupreanof Island, the Irish Creek Site, is about 50 feet in elevation above the present shoreline. Therefore, the high probability zone for Kupreanof Island is defined as all lands from sea level to 75 feet in elevation; the medium probablity zone is all lands from 75 to 125 feet in elevation; and the low probablity zone is all lands above 125 feet in elevation. Rabich-Campbell (1988;42)) also suggests that the north shore of Kupreanof Island has a relatively low site potential compared to the indented shoreline of the west and south shores of the island.

Generally, those alternatives which favor more development pose a greater threat to undiscovered cultural resources. An examination of Table 4-16 indicates that Alternative 5 offers the greatest chance of creating ground disturbance and potentially damaging undiscovered sites, followed in descending order by Alternative 5A, Alternative 4, Alternative 2 and Alternative 3. The No Action Alternative by its very nature would constitute the least threat to cultural resources.

Table 4-15. Ground Disturbing Activities.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt.5	Alt. 5A
Specified Road Miles						
North	28.1	9.9	0.5	18.3	28.1	19.0
South	28.1	14.1	0.5	22.5	31.4	22.2
Spur Road Miles	0.0	3.1	1.7	2.8	6.1	4.5
Acres of Harvest	0	974	384	1040	1635	1456

This assessment differs, however, when the location of ground disturbance is compared to the predictive model proposed in the Kupreanof Island cultural resource overview. (Rabich-Campbell 1988). When ground disturbance is placed within the context of the cultural resource probability model it becomes apparent that none of the alternatives will affect the high probability zone for cultural resources. The implementation of a 500 foot beach fringe buffer zone and a 1,000 foot estuary buffer zone has effectively eliminated the high probability zone from consideration for road construction or timber harvest. Generally, all ground disturbance within the medium probability zones would be targeted for an intensive field inventory. A random selection of units in the low probability zone (usually aobut 5 percent of those units) would be targeted for inventory to validate the predictive model. Given this approach (field inventory of all medium probability units and 5 percent of low probability units), Alternative 5 offers the greatest chance of disturbing cultural resources, followed, in descending order, by Alternative 5A, Alternative 2, Alternative 3, and Alternative 4.

Table 4-16. Cultural Resource Probability Zones

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt.5	Alt. 5A
Acres in High Probability Zone	0	0	0	0	0	0
Acres in Medium Probability Zone	0	198	227	0	283	202
Acres in Low Probability Zone	0	776	157	1040	1352	1254
Total	0	974	384	1040	1635	1456

Before logging and other ground disturbing activities are undertaken in the selected alternative, Forest Service personnel will apply the probability model to inventory cultural resources. The Forest Service will evaluate the significance of any discovered cultural resources, determine potential project impacts and design and implement necessary specific measures to negate any effect on significant cultural resources. Such measures could include relocating or redesigning some timber management activities to avoid disturbing cultural resources, protecting sites through the use of physical barriers and recovering scientific data or otherwise documenting sites that cannot be avoided or protected. An inventory strategy and mitigation measures will be designed and implemented in consultation with the Alaska SHPO to negate adverse project effects on significant cultural resources.

Cumulative Effects

Impacts from decay, natural landscape changes and development pose a threat to the preservation of significant cultural resources in the analysis area. Future timber harvest combined with other ground disturbing activities could result in a loss of cultural resources. Increased access to cultural resource sites also poses a potential threat from vandalism and looting. Previous cultural resource inventories indicate most if not all of the cultural resources are located within a short distance of the present shoreline. It is impossible, however, to determine the exact number and nature of cultural resources that are potentially threatened by future development. Maintenance of a 500-foot beach fringe and a 1,000 foot estuary protective buffer zone for future development will effectively lessen the potential impact to cultural resources. Implementation of field inventories and various mitigation measures will reduce the potential loss by preserving significant sites and by providing data on those that can not be preserved.

Visual Resource

Results of Chapter 3 analysis suggested the following guidelines:

Visual quality objectives (VQO's) to be met by management activities should range from "partial retention" to "maximum modification", with the higher quality objectives being applied on those lands viewed from the ferry lane in Frederick Sound (1985-86 TLMP Amendment).

Harvest in the Portage Bay VCU (442) should maintain a ratio of 80 percent seen or greater, and harvest in the Bohemia Mountain VCU (424) should maintain a ratio of 30 percent seen or greater, in order to avoid harvesting all the nonseen CFL too quickly.

Proposed activities which overlap with sensitive seen area (Visual Management Classes 1 and 2) would need extra attention during project design and layout (that is, require reshaping of unit boundaries, within-stand green tree retention, etc.), particularly where past modification is still evident nearby.

Each of the action alternatives is likely to satisfy basic TLMP direction for visual resource management. The visual condition likely to result from the proposed action would meet VQO's ranging from "preservation" to "modification" in areas seen from Frederick Sound and Portage Bay. Looking down from an airplane, the proposed activities may create an appearance of "modification" to "maximum modification". The Frederick Sound ferry route viewshed would generally be affected less than the Portage Bay viewshed. Some harvest would be seen from within the Wilderness on the Portage Mountain Loop trail; both Bohemia Mountain and the slopes east of Portage Bay are seen as middle and background.

Alternative 1

Portage Bay VCU: 88 percent of existing harvested acres are visible.

This alternative would cause no additional visual impacts within the analysis area. Approximately 4 percent of the seen area in the entire Portage Bay VCU appears modified by existing harvest units, which are located east of Portage Bay. (Past harvest units on the western shores of Portage Bay are no longer visually obvious to a casual observer.) See Map 3-12.

The landscape **east of Portage Bay** would be allowed more time to visually recover from 1984 harvest activities before another entry is made. Existing units in Portage Bay currently meet a "partial retention" VQO. Approximately 7 percent of the seen area east of Portage Bay is visually modified by timber harvest at this time, and will remain in a visually modified condition for the next 20 years.

The landscape **west of Portage Bay** would be maintained in a visual condition of "preservation," contrary to the management possibilities offered by the inventory VQO's of "partial retention" and "modification."

Alternative 2

Bohemia Mountain VCU: 17 percent of proposed harvest acres would be seen.
Portage Bay VCU: 84 percent of proposed harvest acres would be seen.

This alternative would visually affect Portage Bay, with minor visual impacts on Frederick Sound. An additional 3 percent of the seen area in the Portage Bay VCU, and 1 percent of the seen area in the Bohemia Mountain VCU would be modified by proposed harvest units. See Map 4-2.

East of Portage Bay, the combined effects of past and proposed activities to the east would likely maintain an appearance of "partial retention" for most of the seen area. New units would be noticeable from saltwater, but visible portions would be small in size. Most units have been placed south of Stop Island in this entry to allow existing units near the head of the bay more time to visually recover before harvesting adjacent to them. As a result, harvest south of Stop Island may be more consistent with a "modification" VQO, while persons anchored near the mouth of the bay would experience visual conditions consistent with "partial retention". Approximately 12 percent of the seen area east of Portage Bay would appear modified by past and proposed management activities.

To the **west of Portage Bay**, proposed units would likely meet a "partial retention" VQO. Two units are likely to be seen (units 210 and 211). Within-stand modification (that is, reshaping of unit boundaries or leaving clumps of green trees within a unit) would be recommended for these units to achieve a more natural appearance. These units would be seen at an angle from anchorages near the mouth of Portage Bay, but would likely appear as natural patterns as they green up.

Some harvest on Bohemia Mountain and in Portage Bay may be visible from **Frederick Sound**, but would be seen at an angle, and would likely meet a "retention" VQO from such a distance.

Alternative 3

Portage Bay VCU: 84 percent of proposed harvest acres would be seen.

This alternative would visually affect Portage Bay, with fewer impacts to Frederick Sound than described for Alternative 2 because entry into the Bohemia Mountain VCU is deferred. An additional 3 percent of the seen area in the entire Portage Bay VCU would be modified by proposed harvest units. See Map 4-3.

Visual impacts **east of Portage Bay** would be the same as those described for Alternative 2.

The landscape **west of Portage Bay** would be maintained in a visual condition consistent with the VQO's of "preservation", contrary to the management possibilities offered by the inventory VQO's of "partial retention" and "modification".

Some harvest in Portage Bay may be visible from **Frederick Sound**, but would be seen at an angle, and would likely meet a "retention" VQO from such a distance.

Map 4-2. Visual Impacts of Harvest Alternative 2

Frederick Sound

Portage Bay

To Kake

LEGEND

- Study Area Boundary
- Shoreline
- Major Streams
- Existing Roads
- Sensitive Seen Area VMC 1 & 2
- Proposed Clearcut
- Existing Clearcut

MAPSCALE 1:100000

SCALE is 1 INCH = 1.58 MILES

Map 4-3. Visual Impacts of Harvest Alternative 3

Frederick Sound

Portage Bay

To Kake

LEGEND

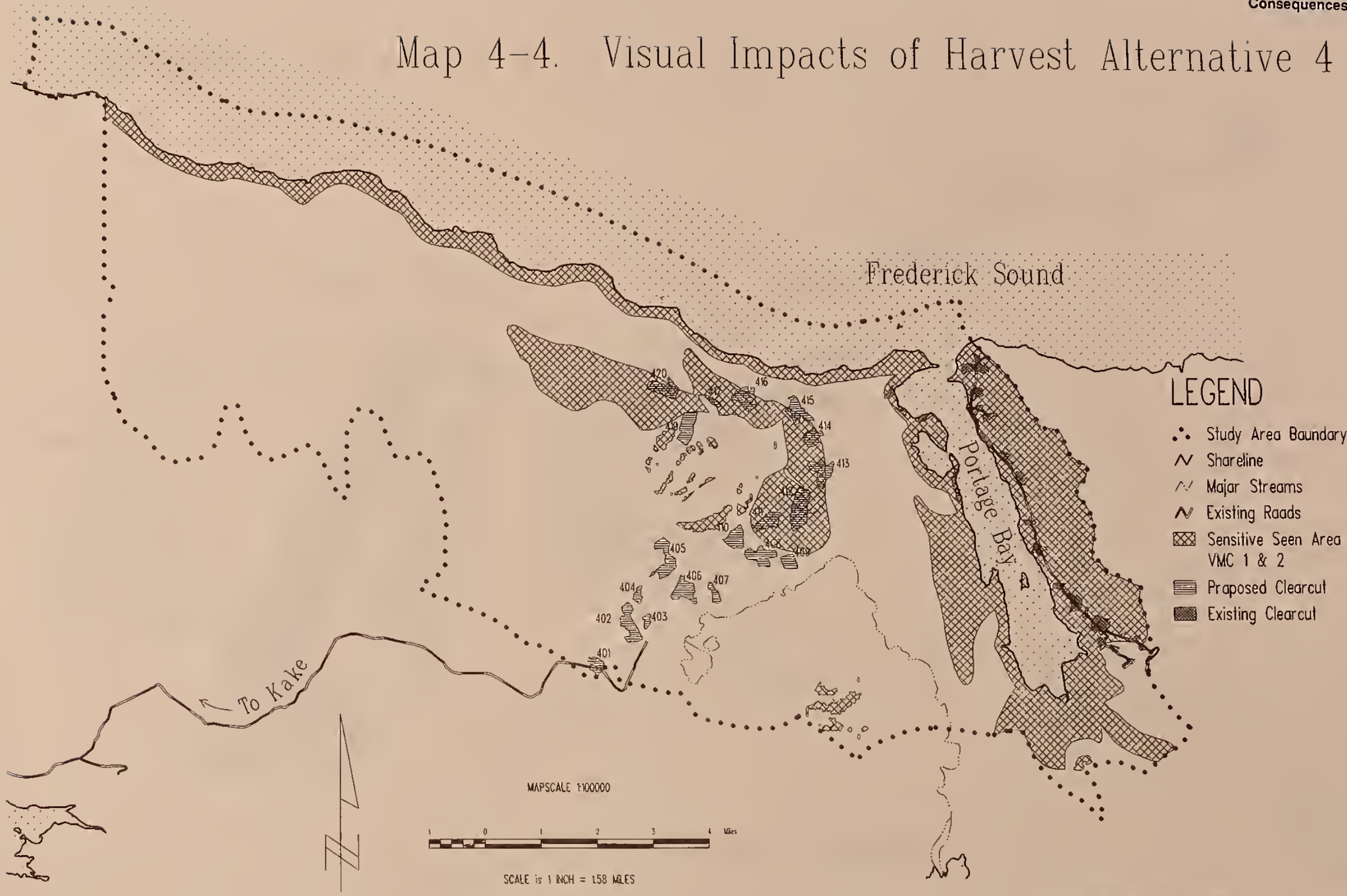
- Study Area Boundary
- Shoreline
- Major Streams
- Existing Roads
- Sensitive Seen Area VMC 1 & 2
- Proposed Clearcut
- Existing Clearcut

MAPSCALE 1:100000

1 0 1 2 3 4 Miles

SCALE is 1 INCH = 1.58 MILES

Map 4-4. Visual Impacts of Harvest Alternative 4



Map 4-5. Visual Impacts of Harvest Alternative 5

Frederick Sound

Portage Bay

To Kake

LEGEND

- Study Area Boundary
- Shoreline
- Major Streams
- Existing Roads
- Sensitive Seen Area VMC 1 & 2
- Proposed Clearcut
- Existing Clearcut

MAPSCALE 1:100000

1 0 1 2 3 4 Miles

SCALE is 1 INCH = 1.58 MILES

Alternative 4

Bohemia Mountain VCU: 45 percent of proposed harvest acres would be seen.

This alternative would have a visual impact on Portage Bay and Frederick Sound due to harvest in the Bohemia Mountain VCU. Approximately 4 percent of the seen area in this VCU would be visually modified. See Map 4-4.

The landscape **east of Portage Bay** would be allowed more time to visually recover from 1983 harvest activities before another entry is made.

To the **west of Portage Bay**, proposed harvest is likely to result in a visual condition of borderline "partial retention"/"modification," depending on the final shape of these units. The combined effects of three units (413, 414 & 415) could result in a "modification" appearance as seen from anchorages near the mouth of Portage Bay. Within-stand modification would be recommended for these units to achieve a "partial retention" VQO.

Portions of six units would be seen from **Frederick Sound** (413, 414, 415, 416, 419, and 420). The combined effects of these units could result in a "partial retention" VQO, depending on final unit shapes. Within-stand modification would be recommended for these units to achieve a "partial retention" VQO.

Alternative 5

Bohemia Mountain VCU: 44 percent of proposed harvest acres would be seen.
Portage Bay VCU: 68 percent of proposed harvest acres would be seen.

This alternative would visually impact Portage Bay and Frederick Sound to a greater degree than Alternatives 3 and 4 combined. An additional 4 percent of the seen area in the entire Portage Bay VCU, and 4 percent of the seen area in the entire Bohemia Mountain VCU would be modified by proposed harvest units. See Map 4-5.

Visual impacts **east of Portage Bay** would be the same as those described for Alternatives 2 and 3, except that several additional units would be visible to the southeast of the head of Portage Bay. One of these units (538) has potential to be highly visible from the Portage Mountain Loop trail, and may be seen from near the mouth of Portage Bay. Within stand modification along the unit's uphill boundary is recommended to meet a "modification" VQO. Approximately 14 percent of the seen area east of Portage Bay would appear modified by past and proposed management activities.

Visual impacts **west of Portage Bay** would be the same as those described for Alternative 4.

Visual impacts to **Frederick Sound** would be the same as those described for Alternative 4, with the exception that some new units in Portage Bay may be visible from the Sound. These would be seen at an angle, and would likely meet a VQO of "retention" as units green up.

Alternative 5A

Bohemia Mountain VCU: 44 percent of proposed harvest acres would be seen.
Portage Bay VCU: 84 percent of proposed harvest acres would be seen.

This alternative would visually affect Portage Bay and Frederick Sound to a similar degree as Alternatives 3 and 4 combined. An additional 3 percent of the seen area in the entire Portage Bay VCU, and 4 percent of the seen area in the entire Bohemia Mountain VCU would be modified by proposed harvest units. See Map 4-6.

Visual impacts **east of Portage Bay** would be the same as those described for Alternative 2.

Visual impacts **west of Portage Bay** would be the same as those described for Alternative 4.

Visual impacts to **Frederick Sound** would be the same as those described for Alternative 4, with the exception that some new units in Portage Bay may be visible from the Sound. These would be seen at an angle, and would likely meet a VQO of "retention" as units green up.

Additional Consequences Common to all Action Alternatives

Roads

New roads proposed around **Portage Bay** would produce little or no additional visual impacts with one exception. Road access to unit 538 in Alternative 5 would be seen from Portage Bay and the Portage Mountain Loop Trail. Its position high on the slope has potential to attract attention.

Proposed roads along the east and north slopes of **Bohemia Mountain** would produce relatively low visual impacts for Portage Bay and Frederick Sound. Generally, the proposed roads are located at the base of the steeper slopes where downslope trees outside the unit are likely to screen the road. Regeneration within the units would likely screen any visible portions of road within approximately five years.

Proposed roads along the south side of Bohemia Mountain are likely to produce the most disturbance because of the numerous switchbacks needed to reach units. However, this area is not currently seen from an inventoried visually sensitive travel route or recreation site. If Alternative 5 is selected with the Kake-Portage road connection, recreational use of this road may increase, necessitating a change in inventory VQO's for the road's viewshed.

Selection between the north route and the south route on the south side of Bohemia Mountain would be important from the visual resource standpoint only if a Kake-Portage road connection was anticipated in the future. The south route would offer more scenic views of the surrounding landscape, as it passes through open muskegs. The north route would bring a recreational traveler through clearcuts and rock pits, with few scenic views except from clearcut openings.

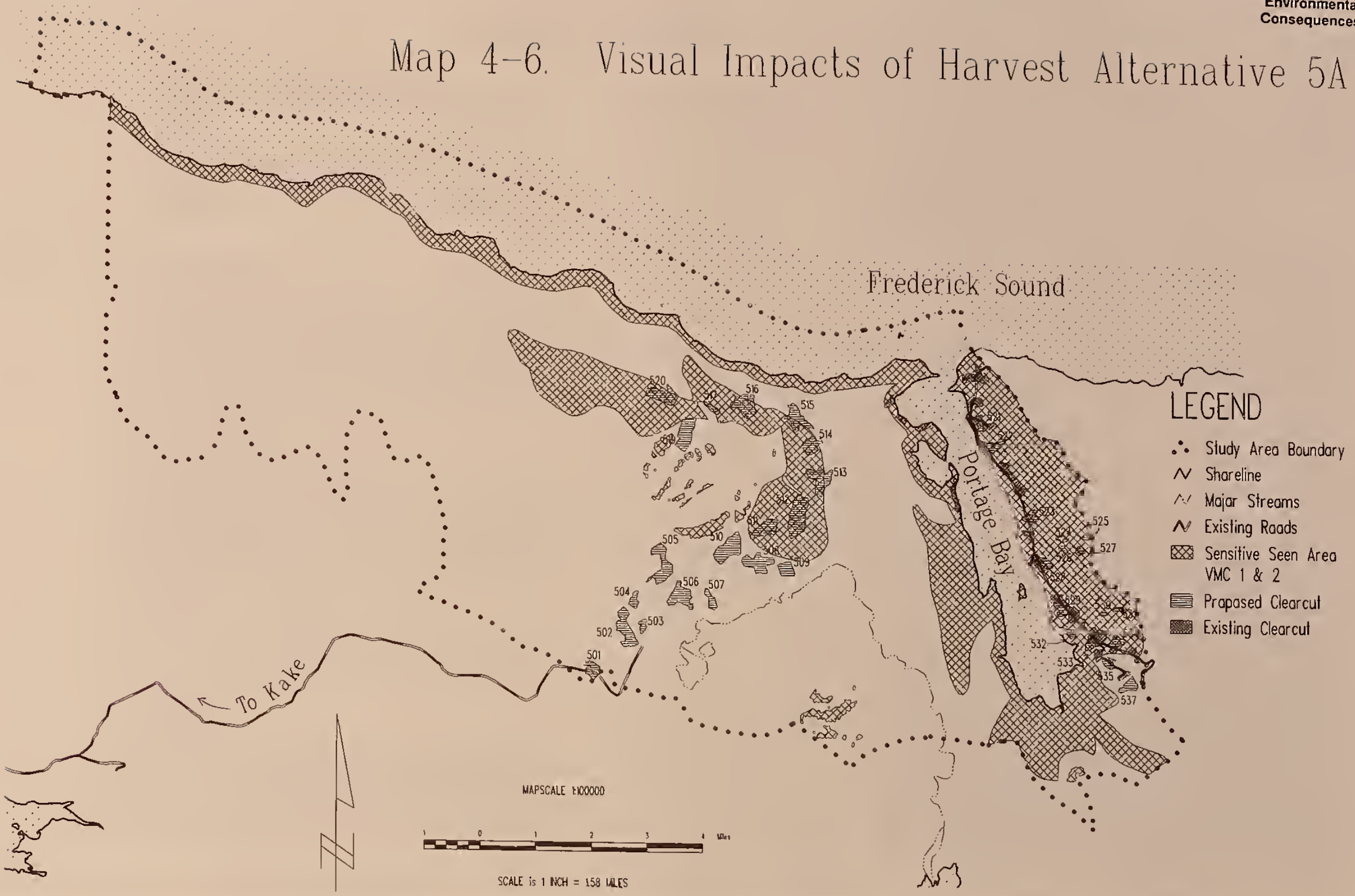
Rock Pits

Landscape design principles would be applied in locating and designing rock pits in sensitive seen areas (VMCs 1 and 2).

Log Transfer Facility Use

No new log dumps would be needed. Use at existing LTF's is not expected to alter their current visual condition, unless a new sort yard is closely associated with them.

Map 4-6. Visual Impacts of Harvest Alternative 5A



Sortyards
If an additional sortyard is required, landscape design principles would be used during location and layout, to reduce visual impacts on nearby sensitive travel routes.

Floating Camp
The addition of a floating camp within Portage Bay would not meet the inventory foreground VQO of Retention for the time it would be in place. Depending on the size and construction materials of the camp, a VQO of "partial retention" or "modification" would result. As soon as the camp is removed, visual impacts would be alleviated.

Cumulative effects over time

Portage Bay VCU (422)
Cumulative visual impacts of the 1980's and proposed 1992 timber harvest would likely disturb approximately 12 percent of the seen area east of Portage Bay (7 percent of the entire VCU). With careful unit shaping, a visual condition of "partial retention" is likely to result from this entry. Future entries, assuming they continue to occur at approximately 10-year intervals, would disturb from 13 percent to 17 percent of the seen area east of Portage Bay (10 percent of the entire VCU) at any one time throughout the remainder of this rotation. This level of timber management could produce a visual condition of "mModification" with the next entry (around 2002). Additional impacts would occur to the Portage Bay viewshed with continued harvest on Bohemia Mountain slopes seen from Portage Bay and with the harvest of blowdown timber as it occurs.

Bohemia Mountain Value Comparison Unit (424)
Visual impacts of first entry timber harvest on Bohemia Mountain would likely disturb approximately 4 percent of the seen area within the entire VCU. With unit shaping, a visual condition of "partial retention" is likely to result from this entry. If future entries occur at 10-year intervals, approximately 10 percent of the seen area would appear disturbed at any given time throughout the rotation. This level of management would likely produce a visual condition ranging from "partial retention" to "modification," depending on unit size and placement (elevation) on the slope. Additional impacts would occur with the harvest of blowdown timber as it happens. If blowdown in subsequent harvests takes place within some of the narrow leave strips, a "modification" to "maximum modification" could result.

If the Kake-Portage road connection is constructed and receives steady recreational use, the viewshed of this travel route would need to be remapped and managed according to its new sensitivity level. This would affect future timber management on the south side of Bohemia Mountain.

Minerals

In order to obtain construction materials for roads described in the action alternatives, rock quarries would be developed at points along the road. Mining interests could examine the exposed rock formations to more accurately estimate the minerals potential of the area. Alternative 5 would expose the greatest area for examination, followed by Alternative 5A, 4, 2, and 3. The helicopter units would not require road construction. There are no known valuable minerals occurring in the Bohemia Mountain analysis area.

Forest Plan Guidance

Readers of this Draft EIS who refer to the Forest Plan Administrative Record will find that the Forest Plan inventory for the Bohemia Mountain analysis area does not agree with the figures used in this EIS (see Table 4-17). The figures in the Forest Plan were based on the analysis of photo points from aerial photographs. The figures in this EIS were developed from a more recent and detailed inventory which was put into a computerized database. The newer database is considered to be more accurate for project level planning in the Bohemia Mountain analysis area.

Table 4-17. Comparison of Volume Classes in Forest Plan Inventory and Bohemia Mountain Analysis Area by Value Comparison Unit (VCU).

VOLUME CLASS Board-Feet/Acre	Forest Plan Operable CFL	Bohemia Mountain EIS Operable CFL
VCU 424		
8-20,000	5,684	9,214
20-30,000	2,916	5,911
30-50,000	673	1,262
50,000+	75	0
Total	9,348	16,387
VCU 441		
8-20,000	N/A	325
20-30,000	N/A	699
30-50,000	N/A	263
Total	0	1,288
VCU 442		
8-20,000	2,219	1,608
20-30,000	1,405	2,151
30-50,000	814	1,436
Total	4,438	5,195
TOTAL	13,786	*22,870

*This total includes the 9,131 acres of .7 HSI wildlife habitat that will be deferred from harvest at this entry.

Timber Economics

The purpose of an economic analysis is to provide a means by which short-term costs and revenues for each alternative can be compared. In this analysis, the net value of each alternative was derived by subtracting all production costs, an amount which includes an allowance for profit and risk, from end product selling values.

Timber markets vary during the timespan between planning and actually selling a timber sale. It is not uncommon for timber values to change by as much as $200 per thousand board feet during this period. Due to these market variations, the estimate of timber end-product selling value was based on a median or middle level of the timber market.

Manufacturing costs were then subtracted to determine "pond log value," or what the log is worth before processing. In addition, to test whether the sale would constitute an economic offering, an allowance for 60 percent of normal profit at the middle market level was included in determining the timber value. Woods production costs were then subtracted from this value in Table 4-18 to arrive at the total net value of each alternative. Table 4-18 also shows costs and values in dollars per thousand board feet to highlight differences between alternatives.

Table 4-18. Timber Values and Costs to an Operator of Average Efficiency

Economic Factor	Alt.1	Alt.2	Alt.3	Alt.4	Alt.5	Alt.5A
Value ($/MBF)*	0	254	265	243	251	250
Costs ($/MBF): Stump-to-Truck	0	139	147	134	137	138
Specified Road						
North Route	0	80	9	140	130	97
South Route	0	95	9	150	136	103
Spur Road	0	16	19	15	19	16
Truck Haul:						
North Route	0	21	4	28	17	26
South Route	0	22	4	27	18	26
Water Haul	0	27	26	28	26	27
Total Costs:						
North Route	0	283	205	345	329	304
South Route	0	299	205	354	336	310
Net Value ($/MBF):						
North Route	0	-29	60	-102	-78	-54
South Route	0	-45	60	-111	-85	-60

* Timber value in $/MBF is pond log value minus 60% normal profit and risk.

Production costs exceeded timber values in four out of five of the action alternatives. The primary reasons why costs were higher than values are the large percentages of volume class 4 and 5, 47 and 42 percent respectively, on operable Commercial Forest Land (CFL), in the Bohemia/Portage area and the amount of specified road required to access the proposed harvest units. Timber values increase with increasing volume class while stump-to-truck costs decrease with increasing volume class. For example, volume class 4 has lower timber values than volume class 5 but has higher stump-to-truck costs. The volume class mix varied somewhat between alternatives, which resulted in a slight difference in timber value per thousand board feet (MBF). Table 4-19 displays acres harvested by volume class for each alternative. The difference in stump-to-trucks costs between alternatives is primarily a function of two factors; relative amount of volume logged with helicopter, and volume class mix. Alternative 3 has the highest stump-to-truck cost per MBF because it has a higher percentage of volume harvested with helicopter than the other action alternatives.

Table 4-19. Acres Harvested by Volume Class for Each Alternative

Volume Class	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A	Existing Clear Cuts
4	157	11	215	256	251	27
5	660	230	785	1,200	1,055	251
6	157	143	40	179	150	156
Total	974	384	1,040	1,635	1,456	434

The cost of specified road for each alternative which harvests timber on Bohemia Mountain has been displayed for both possible routes. The north route would be built on the north side of Duncan Salt Chuck Creek and would cross the stream once. The south route would be built on the south side of Duncan Salt Chuck Creek and would cross the stream twice. One effect of building the road on the south side is to benefit future transportation needs, although it will cost more to access the timber at this time. The difference in haul cost between the north and south route within the context of each alternative is comparable. The main difference in haul cost is in alternative 5; this alternative builds the road from Bohemia Mountain to the Portage Bay transportation system. This allows a significant savings in haul distance and haul cost when compared to the other alternatives which haul the timber from Bohemia Mountain to the Little Hamilton log transfer facility (LTF).

Economic analyses were conducted for the analysis area, under the assumption that deficit alternatives would be implemented, to predict the relative values of future harvest entries. The results of the analyses indicate that future sale offerings have the potential to harvest a majority of the remaining operable CFL in the analysis area with a positive return to the government.

Alternative 3 is the only alternative that is expected to produce a positive return to the government. This alternative has the advantages of an existing road system, short truck haul distance and slightly higher timber values. Alternatives 2, 3, 5, and 5A all include approximately 150 acres which will be helicopter logged. These units vary in size and are located across the upper slopes of the west side of Missionary Range. The remaining units in all alternatives will be logged using highlead or skyline systems.

The stump-to-truck costs for helicopter logging are approximately $45 per MBF higher than for cable, but this is somewhat offset by the fact that no additional road is needed for the helicopter volume.

For timber economics, the greatest real difference between alternatives is in the cost of road per thousand board feet harvested. This difference is due to the varying volume of timber harvested per mile of road built in each alternative. Alternative 3 harvests the most timber relative to the amount of specified road construction, so the road cost per MBF is the lowest. It also has the highest spur road cost per MBF due to the total amount of timber harvested and the total cost of spur road construction.

It must be remembered that these values and costs may differ from the final appraised rates. They are used here to provide an economic basis for comparing the alternatives. During periods of better than average timber values, the return to the government would be positive.

Employment

The number and value of jobs provided by the harvesting and processing of timber on the Bohemia Mountain analysis area is based on the following assumptions:

1. Seven jobs are generated per million board feet of timber harvest.
2. The value of each job is $33,000 per year.
3. The secondary benefit of dollar return to communities is a seven-to-one ratio of the direct job value.

Alternative 5 would generate the most jobs, followed by Alternatives 5A, 2, and 4 (see Table 4-21). Alternative 3 would generate the fewest jobs.

Table 4-20. Number and Value of Jobs Generated by a Bohemia Mountain Timber Sale.

Job Factor	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt.5A
Number Jobs Generated	0	174	76	163	277	244
Dollar Value (million $)	0	5.74	2.51	5.38	9.14	8.05
Secondary Dollar Value (million $)	0	40.18	17.57	37.66	63.98	56.35

Cumulative Effects

Selection of one of the action alternatives would contribute to the continued viability of the timber industry in southeast Alaska and the continued socio-economic stability of southeast Alaska communities. Selection of the no action alternative would not contribute to job or community stability.

Transportation

Forest roads in the Bohemia Mountain analysis area are classified as either specified or spur roads. The differences are related to the length of service life and the need for control of the road construction process.

Specified Roads

All proposed specified roads would be developed and operated for long term land management. As a part of the forest development road system, specified roads serve as primary transportation links in the sale area. They provide access to each of the harvest units and link the units to the log transfer facility. Following the initial entry described in this Draft EIS, specified roads would also be used in future timber harvest entries, for recreation access, and for ongoing silviculture activities such as stocking surveys and precommercial thinning. Their location and design is specified by the Forest Service.

Spur Roads

Spur roads are road segments that run from the specified road into the harvest units and the sort yard. Following the initial entry, water bars will be installed on spur roads, and spur roads will be allowed to grow back, most likely to alder. Feasible spur locations are suggested by the Forest Service but the contractor may choose alternative routes subject to Forest Service approval. Approval is dependent on a location consistent with the same or less impact than the preferred alternative.

Cumulative Effects

The impacts of road construction on the Bohemia Mountain analysis Area are related to the following factors:

The length and location of roads: Specified roads, while providing access, remove some land from timber production and wildlife habitat. Some erosion can be expected as a result of the construction, operation, and maintenance of the roads. (See the Fisheries section for discussion of consequences).

All soil exposed during construction will be grass seeded, and within a few years will not contribute significantly as a sediment source. These grassed roadbeds will be used by wildlife. Spur roads will be closed by removing culverts, installing water bars, and allowing alder to grow over the roadbeds. Since the cutbanks of these roads are seeded and the roadbeds themselves allowed to revegetate, spurs should not provide a source of sediment until they are used again to harvest the second-growth in approximately 100 years.

The most noticeable impact from road construction is the physical alteration of the landscape. The extent of this depends on the terrain on which the road is built. For example, gentle ground often requires no excavation, only rock overlay; very steep ground requires full bench excavation and end haul of excess material.

Road density is defined by the number of miles of forest development road In a square mile. Generally speaking, the higher the road density, the higher the risk of environmental impacts. These risks are minimized and mitigated by standards and guidelines which direct the road location, design, construction, and operation. Table 4-21 displays projected road densities for each alternative.

Table 4-21. Transportation Road Densities by Alternative.

Road Network	Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Bohemia South (net)	0.04	0.21	0	0.36	0.52	0.36
Bohemia North (net)	0.04	0.17	0	0.33	0.48	0.33
Portage Bay Network	1.05	0.10	0.10	0	0.38	0.10

The clearing widths required for forest road development are dictated by the steepness of the terrain and the road design standard. Steeper terrain with high design standards generally produce wider clearing limits resulting in a greater number of acres cleared. Clearing limits can be modified, within the limits of driver safety, when the road parallels fish streams and beaches. Table 4-22 compares road clearing acres by alternative.

Table 4-22. Road Construction Clearing Acres by Alternative

Road Network	Alt.1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Bohemia South (net)	14	74	0	127	180	127
Bohemia North (net)	14	59	0	115	168	115
Portage Bay Network	55	5	5	0	20	5

The number of stream crossings and the amount of road constructed near streams: The construction of culverts and bridges may cause some erosion of sediment into the creeks when and where construction takes place. This will be a short term impact. Culverts will be left in place after harvest is completed.

Number and location of rock pits required for construction materials: Rock pits, like roads, remove lands from timber production and are a long term impact.

Location of log transfer facility (LTF): A log transfer facility provides long term access to the area because it is the easiest point of entry not only to timber sale operations but also to future recreation users. The existing facilities at Little Hamilton Bay or Portage Bay will be used for this timber sale.

Whether or not additional sortyards may be needed to maximize use of the log transfer facilities: During this analysis, proposed sites for additional sortyards will be located and evaluated for both Little Hamilton and Portage Bay log transfer facilities. These additional sites may be necessary to accommodate more than one operator at a time and for short time storage of logs.

Whether or not the road system connects with any other road system: In one of the action alternatives, Alternative 5, the Kake Network, specifically Forest Development Road 6030, would be connected to the Portage network. In the other action alternatives, a portion of road 6030 would be constructed, increasing the likelihood of a possible connection at a later date. This could possibly encourage the State to eventually make a decision to construct the next link to Petersburg. Private passenger vehicle use is anticipated on these roads, although it would most likely be light due to the length of day trips to recreate, etc.

The Kake/Portage road connection would (1) allow transportation of vehicles between Portage Bay and Petersburg via the Alaska Marine Highway System and the completed road, (2) improve access to the Forest Service administrative site and the logging camp at Portage Bay, (3) benefit businesses in Kake since some shopping by residents of Portage Bay would likely occur, (4) enhance Forest Service multiple use management, including sale administration and other project work because crews could utilize the Portage Bay administrative site, (5) increase vehicle accessibility to Portage Bay for other management activities, (6) provide future timber management flexibility by utilizing both log transfer facilities, (7) enhance Kake Tribal Corporation's ability to bid on National Forest timber sales, (8) increase roaded recreational opportunities in the Portage Bay and Bohemia Mountain areas, and (9) provide trailhead opportunities for access into the Wilderness area from a road.

Every effort will be made to locate roads to avoid slope stability problems, provide stable low-impact stream and drainage crossings, and minimize construction and haul costs. Natural conditions of the landscape will be altered by construction and, depending on the nature of rock sources, may create contrasting soil color. This may be noticeable on roads constructed on the mid-slope of steep ground.

Energy Requirements

The amount of energy needed to implement the harvest of timber under each alternative is based on the following asssumptions:

1. The rate for timber sale preparation and administration is 0.5 gallon per thousand board feet.
2. The rate for high-lead logging is 2 gallons per thousand board feet.
3. The rate for loading and hauling by truck and for water transport is 8 gallons per thousand board feet.
4. The rate for road construction is 4,000 gallons per mile.
5. The rate for road maintenance is 20 gallons per mile.
6. For the helicopter units, a Bell 214B helicopter would use 160 gallons per hour and would yard 20,000 board feet per hour (8 gallons per thousand board feet).

Table 4-23 shows the energy used for each action alternative:

Table 4-23. Estimated Fuel Consumption for Each Alternative on the Bohemia Timber Sale.

Fuel Consumption	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 5A
Thousands of gallons						
North	0	340	151	329	590	497
South	0	357	151	342	603	510
Average gallons/MBF						
North	0	13.7	13.8	14.2	14.9	14.3
South	0	14.4	13.8	14.7	15.2	14.6

List of Preparers

List of Preparers

Members of the interdisciplinary team (IDT) responsible for conducting the Bohemia Mountain Study Area analysis and for preparing the Environmental Impact Statement are listed alphabetically below:

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John Edgington *Fisheries Biologist*	B.S. Game Management M.S. Fisheries Management 30 years total experience (1 year Forest Service) 19 years Alaska Deptartment Fish and Game
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List of Agencies, Organizations and Persons to Whom Copies of this Statement were Sent

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The following organizations and individuals are on the mailing list to recieve the Draft EIS:

State Agencies
Alaska Department of Environmental Conservation (1)
Alaska Department of Fish and Game (1)
Alaska Division of Governmental Coordination (5)

Federal Agencies
Chugach National Forest
Federal Agency Liaison Division, Washington, D.C. (5)
U.S. Environmental Protection Agency, Seattle (5)
U.S. Department of Interior, Office of Environmental Project Review (18)
U.S. Fish and Wildlife Service, Juneau (1)
U.S. Fish and Wildlife Service, Anchorage (1)
U.S. Forest Service, Alaska Regional Office, Juneau (30)
U.S. Forest Service, Washington Office, Washington, D.C. (5)
U.S. Forest Service, Chatham Area (5)
U.S. Forest Service, Chugach National Forest (5)
U.S. Forest Service, Petersburg Ranger District (20)
U.S. Forest Service, Stikine Area Supervisor's Office (30)

Organizations (1 each)
Alaska Geographic Society
Alaska Loggers Association
Alaska Timber Corporation
Alaska Center for the Environment
Alaska Trollers Association
Alaska Pulp Corporation
City of Kake
City of Kupreanof
City of Petersburg
City of Wrangell
Colorado State University- Documents Department
Kake Tribal Corporation
National Marine Fisheries
Organized Village of Kake
Petersburg Chamber of Commerce
Petersburg Conservation Society
Petersburg Fish and Game Advisory Committee
Petersburg Indian Association
Petersburg Pilot

Petersburg Public Library
Petersburg Vessel Owners Association
Reid Brothers Logging Company
Sierra Club Legal Defense Fund
Soderberg Logging & Construction
Southeast Alaska Conservation Council
Southeast Alaska Seiners
Wrangell Forest Products Limited
Wrangell Public Library

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Dixie M. Baade
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Honorable Lloyd Jones
Honorable Robin Taylor
Kurt and Diane Hoelting
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Victoria McDonald
Harold Medalen
Michael Medalen
Mitkof Lumber Company, Haines
Ted Morrison
Larry Morse
Samuel Rabung
Charles P. Van Epps

Glossary

Glossary

Alaska National Interest Lands Conservation Act (ANILCA)
Passed by Congress in 1980, this legislation designated 14 national wilderness areas in southeast Alaska.

Anadromous
Refers to those fish, usually salmonids, that spawn (some also rear) in freshwater and mature in saltwater.

Aquatic Habitat Management Unit (AHMU)
An area of stream and associated streamside habitat having fish values of such importance that land use activities will be prescribed to meet the management goals for fish habitat.

Beaver slide
A nonviolent system of placing logs into the water at a log transfer facility.

Buffer Zone
An area surrounding a special feature in order to protect it from development.
eagle nest trees: 330 foot radius around eagle nest trees
cultural sites: as needed

Carrying Capacity
The number of animals that an area can maintain in a healthy condition.

Commercial Forest Land (CFL)
Commercial forest land is land that can produce at least 8,000 board feet of timber per acre in one hundred years.

Cultural Resource
Any evidence of mankind's activities and behavior; includes data from archeology, architecture, ethnology, and history.

Dispersed Recreation
Outdoor recreation use occurring outside a developed recreation site; includes such activities as scenic driving, hunting, backpacking, and boating.

Distance Zones
Landscape areas denoted by specific distances from the observer, and characterized by the level of detail apparent in the subject.

Foreground: The detailed landscape within 0 to 1/4-1/2 mile of the viewer. Individual leaves and branches provide coarse texture.

Middleground: The area located within 1/2 to 3-5 miles of the viewer. Individual trees and tree groupings provide texture and form.

Background: The area within 3-5 miles to infinity of the viewer. Texture becomes indiscernible; shapes and washes of color become more dominant than texture.

Estuary
For purpose of this EIS process, estuary refers to the relatively flat, intertidal, and immediate upland areas, generally found at the heads of bays and mouths of streams. They are predominantly mud and grass flats and unforested except for scattered spruce or cottonwood.

Floodplain
The lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands, including, at a minimum, that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given area.

Forbs
Any herbaceous plant, other than a grass, that dies back every year. Often grows in a field or meadow.

Group Selection
Removal of trees in groups smaller than 2 acres in size. It is an *uneven* age management system, where clearcutting in an *even* age management system.

Habitat Capability
The number of healthy birds or mammals that a habitat can sustain. In this document it refers to Sitka black-tailed deer, marten, black bear, river otter, and bald eagle capability.

Habitat Suitability Index
A computer model index that quantifies the capability of habitat to support particular species of wildlife.

Helicopter Yarding
A process of removing logs from the harvest unit where the helicopter picks up the logs right where they are cut and moves them to a central location on a road or landing to be hauled away by truck or moved by helicopter directly to the water for transport.

High Lead Cable Logging
A method of transporting logs to a collecting point by using a power cable passing through a block fastened off the ground to lift the front ends of the logs clear off the ground while in transit.

High Value Wildlife Habitat
Having a combined habitat suitability index of .7 or greater, and/or has been determined through field reconnaissance to have significant value for use as cover forage or security.

Inoperable Timber
Timber which is not practical to harvest because of potential resource damages, economic infeasibility, physical limitations or inaccessiblility.

Interdisciplinary Team (IDT)
A group of individuals representing different areas of knowledge and skills focusing on the same task, problem, or subject.

Irretrievable Commitment
The production or use of renewable resources that is lost because of allocation decisions. It represents opportunities foregone for the period of time that the resource cannot be used.

Irreversible Commitment
Commitment of resources that are renewable only over a long period of time, such as soil productivity, or to nonrenewable resources, such as cultural resources or minerals.

Land Use Designation (LUD)
The method of classifying land use by the Tongass Land Management Plan. Land uses and activities are grouped together with a set of coordinating policies, an essentially compatible combination of management activities. A brief description of the four classifications follows:

LUD I: Wilderness areas.

LUD II: These lands are to be managed in a roadless state to retain their wildland character, but this designation would permit wildlife and fish habitat improvement, utility corridors, and primitive recreation facility development and roads under special authorization.

LUD III: These lands are to be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.

LUD IV: These lands will provide opportunities for intensive resource use and development. Emphasis is primarily on commodity or market resources.

Log Transfer Facility (LTF)
A facility located where the road network terminates at saltwater. May be used for a number of transportation purposes. For timber harvesting, the log transfer facility is where logs are bundled and placed into rafts on the water for towing to local mills.

Mass Failures or Mass Movement (wasting)
The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture, and does not include individual soil particles displaced as surface erosion.

MBF and MMBF
Thousand board feet and million board feet, respectively.

Mid-Market
Mid-market timber is timber which a mid-market assessment described herein indicates would provide a weighted average margin for profit and risk of at least 60% of normal. The mid-market assessment to mid-market timber shall be based on mid-market weighted average pond log value, estimated logging and road costs, normal profit ratios, and base rates developed using standard Forest Service appraisal methods and data in effect on the date the Forest Service initiates the NEPA process (Notice of Intent is published in the Federal Register).

Pond Log Value--Mid-market average pond log value shall be determined as follows: 1) Appraisal data to develop a mid-market pond log value shall be determined for each species, and shall be the standard Forest Service appraisal data in effect in the quarter in which the pond log value (end-product selling price less manufacturing cost) for the species and product mix most closely matches the point between the ranked quarters of the Alaska Index Operations pond log value, adjusted to Common Year Dollars, where one-half of the timber from the Tongass National Forest has been removed at higher values and one-half of the timber from the Tongass National Forest has been removed at lower values during the period from the first quarter of 1979 to

the quarter current on the NEPA start date. When more than one quarter would qualify, the most recent shall be used. 2) Mid-market weighted average pond log value shall be calculated by volume class, adjusted to Common Year Dollars, using appraisal data determined for each species.

Common Year Dollars-- dollars adjusted to the NEPA start date, using the relevant indicies in the Producer Price Index for all commodities published by the USDL Bureau of Labor Statisics.

Mining
Includes all operations (prospecting, exploration, development) for the extraction of mineral resources--underground, placer, and open pit mines; rock, and sand and gravel borrow, etc.

Mitigation
Action or actions taken to avoid or minimize negative impacts of a management activity. Includes avoiding an impact altogether by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Monitoring
Following a course of events to determine what changes occur as the result of an action.

NEPA
National Environmental Policy Act of 1969.

New Perspective
New Perspective is the pathway for implementing certain of the new directions in the 1990 RPA Program (the Forest Service's 5-year strategic program for carrying out its mission under federal laws and regulations) and new Forest and Research plans. These plans and programs call for their full array of values and benefits, with increased emphasis on fisheries, wildlife, recreation, ecological sustainability, and long-term productivity. The two main goals of New Perspectives are 1) to demonstrate the new directions for socially responsive and scientifically sound management of lands and resources to meet people's needs for forest and rangeland products while protecting natural and cultural resources for long-term health of the land and quality of life, 2) to develop the new scientific knowledge and technologies needed to better manage forest and rangeland ecosystems.

NFMA
National Forest Management Act of 1976.

Non-Commercial Forest Lands
Lands with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest Land.

Primary Protection
Primary Protection of Primary Streamcourses is a timber sale contract provision requiring the protection of designated "Primary" streams. This involves developing an Operating Plan (including timing and guyline circle trees) for falling timber within a 200-foot streamside strip, directional felling away from streamcourses, immediate yarding of any trees entering streamcourses, leaving designated felled or windthrown trees that

have entered streamcourses, and full suspension yarding across such streamcourses. "Primary" streamcourses are usually fish streams or other streams requiring a high degree of water quality protection.

Profit & Risk
That portion of the appraisal allocated to industry profit, interest on borrowed capital, risk, and income taxes.

Profit & Risk Margin
The monetary estimate of Profit & Risk

Recreation Opportunity
The availability of real choice for recreationists to participate in a preferred activity within a preferred setting, in order to realize those satisfying recreation experiences which are desired. Recreation opportunities are often described in terms of six classes of opportunity:

Primitive: The most remote, undeveloped, and inaccessible opportunities. Generally includes areas out of sight and sound of human activities and greater than three miles from roads or waterways open to public travel.

Semi-Primitive, Non-Motorized: Limited opportunities for isolation from the sights and sounds of humans, and a high degree of disturbance of the natural environment. Generally includes those areas greater than 1/2 mile and less than three miles from waterways, with roads and trails open to motorized use.

Semi-Primitive, Motorized: Predominantly unmodified natural environment with minimum evidence of sights and sounds of humans with primitive roads and trails open to motorized use. Generally includes areas less than 1/2 mile from waterways. Roads are not maintained.

Roaded, Natural: Predominantly natural environments with moderate evidence of sights and sounds of humans. Includes areas less than 1/2 mile from roads open to public travel, railroads, waterways, major powerlines and within resource modification areas.

Rural: Includes those areas within small communities, developed campgrounds, developed ski areas, and administrative sites. Modifications are primarily to enhance specific recreation activities. Sights and sounds of humans are readily evident.

Modern-Urban: Substantially urbanized environments, although the background may have elements of a natural environment. Renewable resource modifications and utilization practices are common. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant.

Resident Fish
Fish which are not anadromous and which reside in fresh water on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat and rainbow trout.

Riparian Ecosystems
Includes wetlands, streams and lakes, and those areas around streams and lakes which can influence the aquatic environment.

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Road Maintenance Level 1
Roads closed after use, maintain drainage systems (pipes, ditches, and culverts).

Road Maintenance Level 2
Roads maintained for high clearance vehicles only, remove cut bank slumps and slides only when necessary to provide for continued use (may be one lane only).

Road Maintenance Level 3
Maintained for passenger use; user comfort is an important aspect. Subject to Highway Safety Act as far as signing and traffic control requirements.

Rock Weathering Agent
A compound that is sprayed on rocks to speed natural weathering by accelerating the oxidation process. Harmless to plants and wildlife, it is used to make disturbed land blend in with the natural landscape.

Rotation
The planned number of years between the formation of regeneration of a stand and its final cutting at a specified stage of maturity.

Secondary Protection
Secondary Protection or Protection of Secondary Streamcourses is a timber sale contract provision requiring the protection of designated "Secondary" streams. This involves removing timber felled across such streams within same operating season, and removing logging slash from the streamcourse before the yarder leaves the harvest unit or upon completion of seasonal logging activities, whichever comes first. "Secondary" streamcourses are those which do not possess fish habitat but could affect habitat downstream.

Sedimentation
Addition of fine organic or inorganic material to a stream channel. Usually that portion remaining in the streambed gravel.

Sensitivity Levels
A measure of viewer interest in scenic quality of the landscape as seen from roads, trails, waterways or other travel routes and from facilities or other areas of the national forest that have significant public use. Level 1 has the highest sensitivity, level 3, the lowest.

Setting
The setting identifies the timber stands that are tributary to a landing by use of a given timber harvest system.

Shear Strength
Ability to resist shear stress, which is the force of two planes pushing against one another and producing parallel but opposite sliding, like a fault line.

SHPO
State Historic Preservation Officer

Skyline
A cableway stretched tautly between two points and used as a track for a block or carriage.

Soil Hazard Classes

Mass-wasting as used here is restricted to relatively shallow translational failures of the soil mass, and specifically excludes deep rotational failures and debris failures within stream channels. While slope gradient is the primary site factor determining the stability of natural slopes, soil and geologic properties, such as cohesion, moisture regime and the presence of a prominent slip-plane are used to determine relative stability of soil/landtype units. The relative ranking is based on state-of-the-art research, laboratory data on soil properties, as well as our collective experience in the management of similar soil/landtype areas on the Tongass N.F.

High: The soil/landtype units in this class are the least stable, and have the greatest probability of slope failure. These units generally have slope gradients that exceed the natural angle of stabilty. It includes most well drained soils on slopes of 75 percent or greater, as well as some soils with restricted drainage (somewhat poorly and poorly drained soils) on slopes in excess of 65 percent. Most naturally occurring landslides initate in units of this class. They often, but not always, have visible indications of instabilty or past failures, such as slide scarps, tension cracks, jack-strawed trees, mixed pedogenic horizons etc.

The risk of management-induced slope failures is so high on these areas that they are generally precluded from normal forest harvest and roading activities. Where management activies cannot be avoided on these areas, site specific investigations are necessary to determine on a case-by-case basis; (1) the probability of failure based on a site-specific stability analysis; and (2) the likely effect of a failure on associated resources such as water quality, fish habitat, etc. Forest roads can sometimes be built on these areas by locating them on included areas of less sloping benches, or by the application of unusual, and often prohibitively expensive, mitigative measures such as retaining walls, buttresses, bulkheads or other external support systems.

Moderate: The soil/landtype units in this class are generally stable in an undisturbed condition; however, any natural disturbance or management practice that adversely changes the complex soil strength-stress relationship can result in slope failures. These areas rarely have visible indications of instability.

Soil/landtypes in this class can be safely managed without a high risk of landslides by application of management practices designed to maintain the shear strength of soil and roots, and avoid increasing the effective weight of the soil mass. Management practices should be designed to avoid interrupting the natural surface and subsurface drainage patterns and minimize disturbance to the soil surface.

Low: Soil/landtype units in this class have the least probability of landslides. Any slope failures that do occur are usually associated with included incised stream channels (V-notches), or short steep escarpments. This class includes most soils with slope gradients less than 35 percent.

These areas are normally not subject to landslides; however, management practices designed to protect streambanks and V-notches, and prevent surface erosion are appropriate.

Swale

A slight depression, sometimes swampy, in the midst of generally level land.

Temperature-Sensitive Stream

Those streams flowing out of lakes or muskegs, or for some other reason susceptible to warming beyond a tolerable level for fish.

Track Loader
A short yarding distance, high-lead system.

Unit
A term from the Timber Sale Contract. This term is used to describe the smallest identifiable portion of land included in a timber sale for timber harvest. Each Unit consists of one or more settings and associated landings. All the settings included in a Unit are planned for timber harvest using the same yarding method and are in proximity to each other.

VCU - Value Comparison Unit
A distinct geographic area that generally encompasses a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.

Visual Absorption Capability (VAC)
A measure of the relative ability of the landscape (high, intermediate or low) to absorb visual change. Ratings are based on landform complexity, slope, viewer aspect/angle and vegetative screening. High VAC is characterized by low rolling topography or unseen slopes where management activities are not likely to be seen. Low VAC is characterized by steep, highly visible hillsides with a uniform cover of vegetation.

Visual Management Classes (VMC's)
A product of the combination of VQO's and VAC's, Visual Management Classes indicate the management objective and the relative effort required to meet that objective. VMCs 1 and 2 indicate areas of high scenic value or landscapes with steep, highly visible slopes. Special attention to project design would be necessary to meet VQOs. VMCs 3 and 4 indicate areas that are generally not seen or that have low, rolling topography, and VQOs would be relatively easy to meet.

Visual Quality Objectives (VQO's)
VQOs are standards for visual quality which reflect the varying degrees to which the landscape may be modified. The standards are based upon viewing distance, the character of the natural landscape, and the public's concern for scenic quality. "Inventory" VQO's have not yet undergone trade-off analysis relative to other resources. "Adopted" VQO's reflect analysis involving other resources and become management direction in a selected and approved land management alternative, usually as part of a forest land management plan. The five visual quality management objectives follow:

Preservation (P)--Only ecological changes occur. Management activities, except for very low visual impact recreation facilities, are not prescribed.

Retention (R)--Provides for management activities which are not visually evident. Visual effects of management activities on the natural landscape are evident to the average viewer.

Partial Retention (PR)--Management activities may be evident to the viewer, but must remain visually subordinate to the surrounding landscapes.

Modification (M)- Management activities may be easily noticed and attract attention, but borrow from naturally established form, line, color, and texture to create natural patterns.

Maximum Modification (MM)-- Land management activities may be strongly evident and dominate the natural landscape, but appear as a natural occurrence when viewed as background.

Wetlands
Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Winter Range
Areas used by animals from December through March, when many sources of food are covered with snow. For deer, winter range is generally found below 1200 feet elevation on north-facing slopes and below 1500 feet elevation on all other slopes. During severe winters, the greatest number of deer can be supported by high-volume, old-growth stands on south-facing slopes, below 500 feet elevation and within 1/4 mile of salt water.

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Appendix A

APPENDIX A

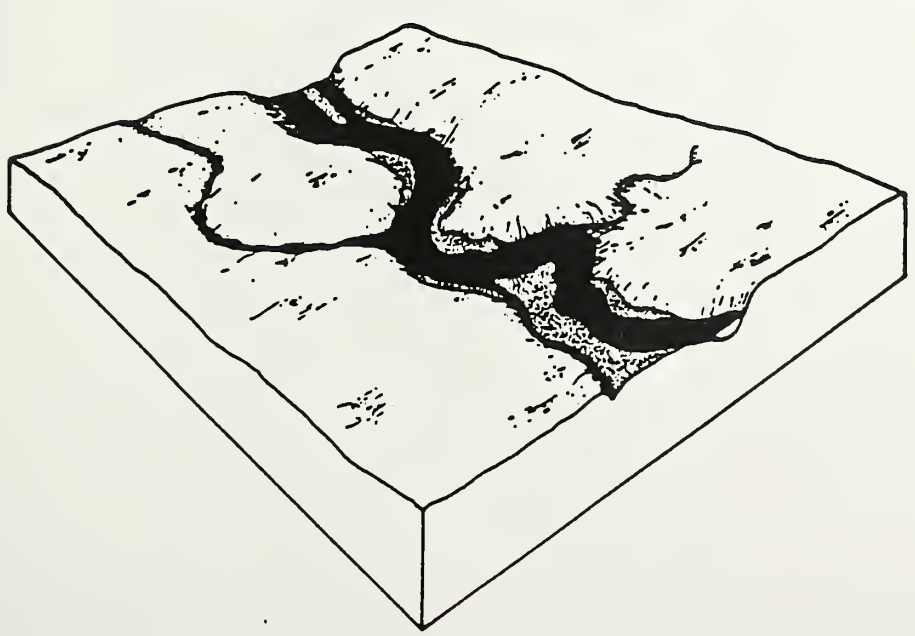
STREAM CHANNEL PROCESS GROUPS

The term "process group" refers to a group of stream channels that were all formed by the same geologic processes. This appendix describes nine different process groups, lists the stream channel types in each group, and explains some of the management implications of each group.

Floodplain Stream Channels

These are channels (designated as B1, C1, C3, C4, and C6 channel types in the process group delineation in Draft F of the Tongass Land Management Plan Revision) with active floodplain development. Floodplain channels have a two-way interaction (that is, 1) water flows out as flood, with materials deposited and 2) detritis, etc. falls in and provides nutrients) between the stream channel and the floodplain area through bank erosion, channel migration and overflow, leaf fall, and blowdown/tree fall. Alluvial channels process energy for the stream and are an important source of nutrients. Flooding is a fundamental process in alluvial channels. The riparian zone is usually very broad and adjacent upland plants do not directly influence the riparian areas.

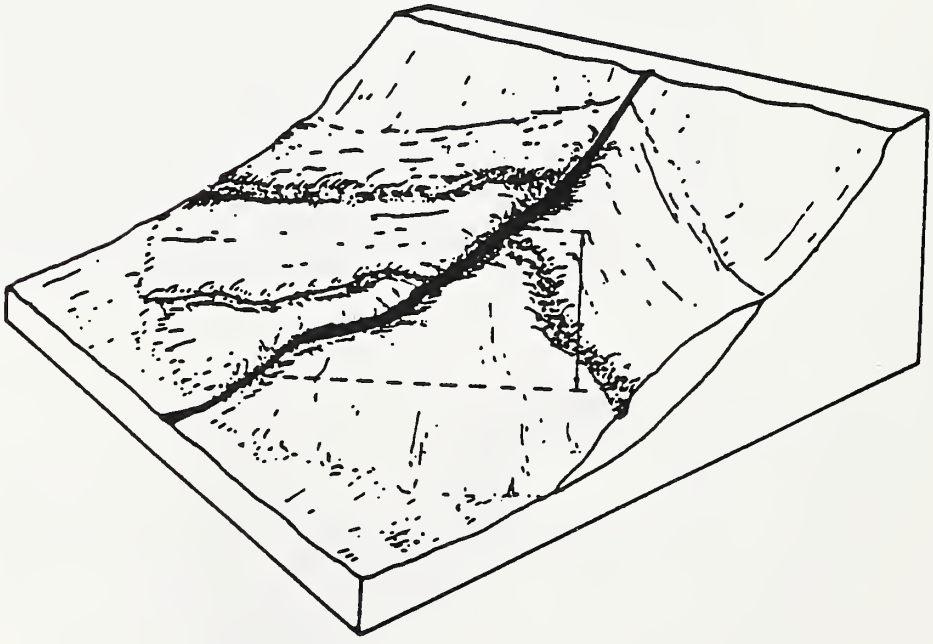
The riparian areas are extremely dynamic because streamflows within alluvial or uncontained areas are generally poorly contained and flood during seasonal or individual storms. Stream channel banks consist of unconsolidated materials, either alluvial sands, gravels or organic material. Channel migration and braiding of the stream channels occurs with varying frequency, depending on bank and bed stability. The bed and bank stability are usually tied to the adjacent plants. Trees and shrubs are very important to controlling the stability of the streambanks, as their root network often is the only thing holding together the unconsolidated alluvial streambank soil. Large Organic Debris (LOD) plays an important role in controlling the stability of the stream bed and banks by regulating the stream's energy dissipation. Habitat forms in the pool riffles caused by the energy dissipation. The riparian area adjacent to the alluvial channels encompasses the channel banks, active channel floodplain, sloughs, backwater overflow channels, and ponded swales. Because of the interactions of the stream with the adjacent landform, the alluvial channels contain a richer, more abundant community of fish than found in contained stream channels.



Channels on the Alluvial Fans

These channels (designated as A3 and B5 in the process group delineation in Draft F of the Tongass Land Management Plan Revision) are transitional, being streams that are dominated by both sediment transport and sediment deposition. High energy streamflows of low to moderate magnitude are delivered to fans from their contained drainage basins located upstream. Flood flows which occur espisodically are a result of flash floods or debris torrents delivering high volumes of sediment which are quickly deposited on the streambed, streambanks, and areas adjacent to the stream. Stream channel migration or abandonment often occurs during these events. The stream channels are numerous and are generally found throughout the fan area. Many of the channels are ephemeral, flowing only after certain levels of precipitation.

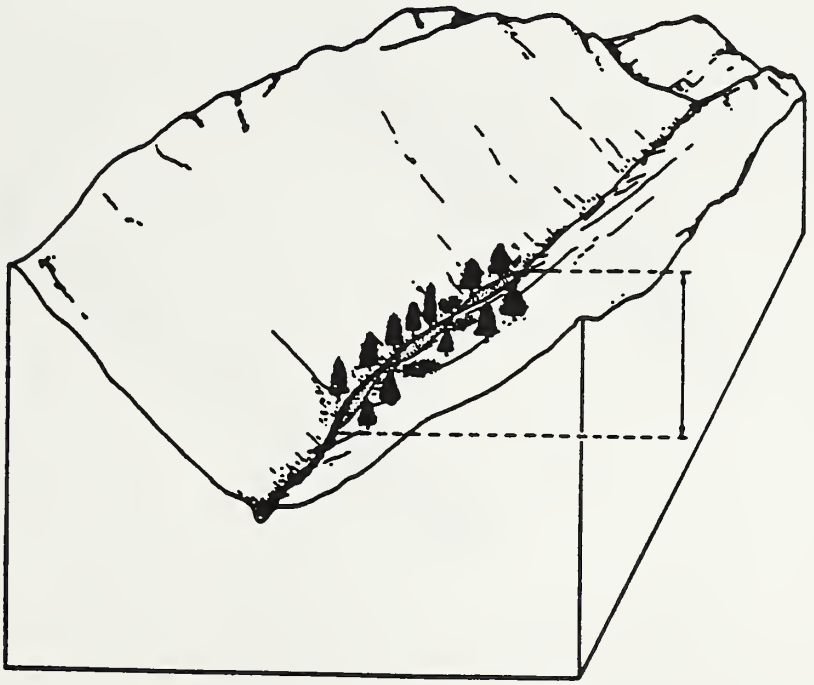
The rearing and spawning habitat value of fan channel types for salmon and trout varies from high to low. The channels are unstable, and sometimes intermittent during low streamflow periods in the summer and winter months, thereby limiting their use for rearing coho salmon and resident trout. The gravel beds are unstable due to the high energy flows and the large amounts of coarse gravels moving through the fan channels, so successful spawning is limited. However, on the toe end, or lower gradient portions of the fans, the value is higher for spawning and rearing for coho and pink salmon. Where abundant large organic debris is present, the value for coho salmon can be moderate to high. The toe ends are also characterized by more stable gravel beds, thereby increasing spawning value.



Channels with "Mixed" or Colluvial Control

As the name implies, these channels (designated as B2 and B3 channels in the process group delineation in Draft F of the Tongass Land Management Plan revision) are a mixture of stream channel containment. Some segments are controlled by bedrock or the valley walls, while other areas have minor floodplains. Within these moderate gradient channel types, the bedrock segments of the channel act as sediment transport systems, while bed materials are deposited in the lower gradient, and floodplain development is apparent.

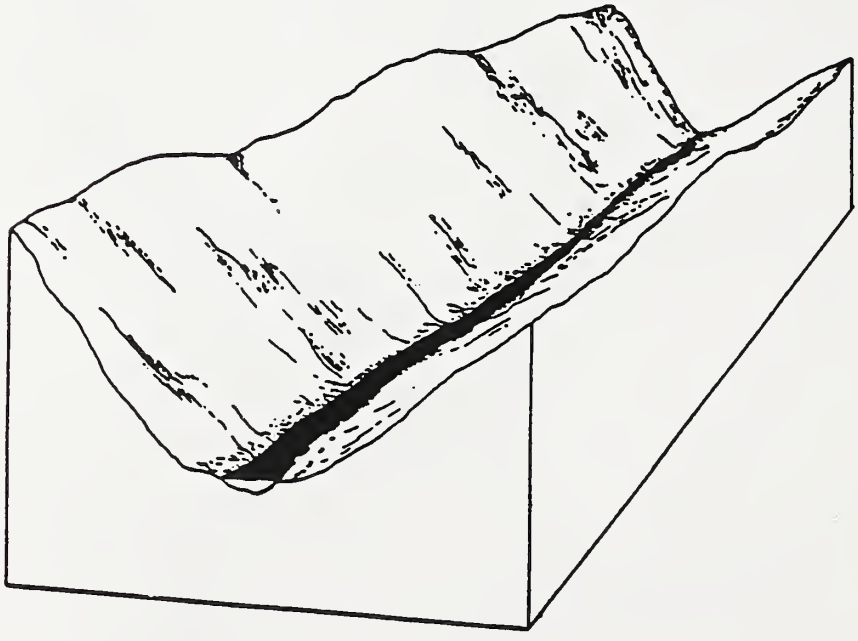
The habitat capability and sensitivity of these channels to disturbances caused by management is midway between floodplain and contained channels. The importance of the interaction between the stream channel and riparian vegetation is intermediate. Much of the better rearing habitat, particularly the coho salmon winter refuge habitat, is associated with LOD accumulations in the stream. Within "mixed" channel types microhabitats that provide winter refuge may be even more important than in the alluvial streams.



Low Gradient Contained Channels

These are streams (designated as C2, C5 channel types in the process group delineation in Draft F of the Tongass Land Management Plan Revision) where the channel is contained by the adjacent landform with the channel having little effect on that landform. The adjacent influence zone often extends to the slope break above the incised valley slope. The width of the zone of influence on the aquatic habitat is dependent upon the adjacent upland soils and vegetation (primarily trees). The adjacent vegetation plays a major role in controlling the rate of downslope movement of soil into the stream channels, as well as providing energy dissipation structures in the stream channels to trap and store sediment that is being transported downstream.

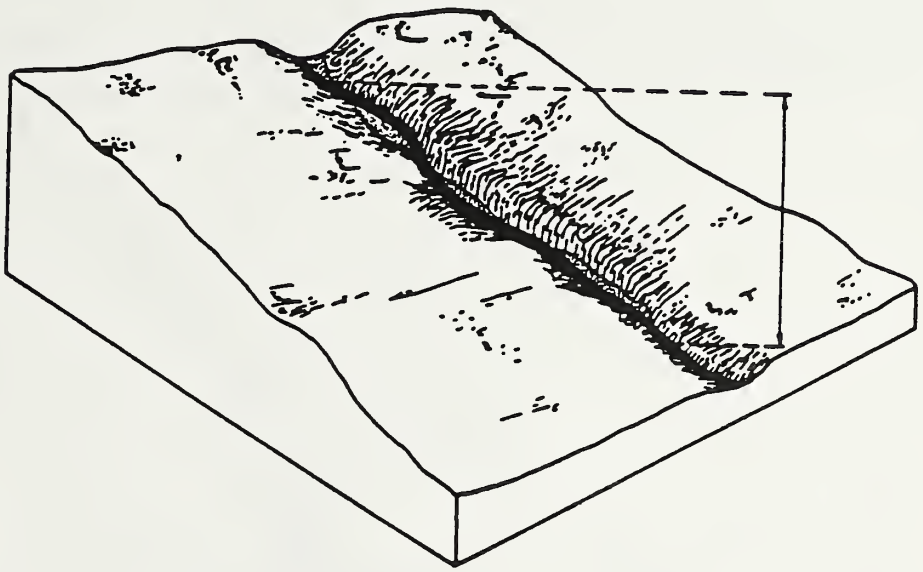
The lower gradient channels contain habitat for large numbers of spawning pink salmon, particularly in the lower segments where large accumulations of suitable-sized spawning substrates exist. Rearing habitat, particularly winter refuge habitat, is limited to sections of the stream where large quantities of LOD have accumulated in the stream.



Moderate Gradient Contained Channels

These channels (designated as B4 and B6 channel types in the process group delineation in Draft F of the Tongass Land Management Plan revision) are also contained by the adjacent landform, with moderate instream gradients. Stream energy, substrates, and run-off are effectively contained by landform or streambank features. When the adjacent sideslopes are short, low gradient or absent, the influence zone is narrow. This group can have streams with very large, high gradient sideslopes which correspond to large areas that influence stream conditions. These streams are very much influenced by the highly sensitive natures of these sideslopes.

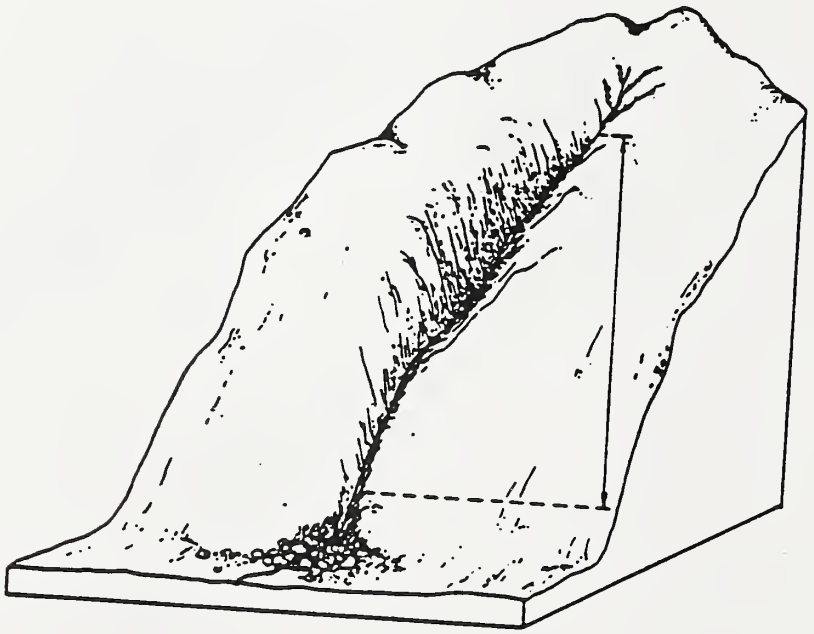
The moderate gradient channels contain limited amounts of anadromous fish habitat. When access is available, spawning habitat is limited due to lack of suitable-sized substrates. Rearing habitat is limited to summer habitat for coho and steelhead trout. Moderate gradient-contained channels usually provide moderate resident fish rearing potential.



High Gradient Contained Channels

These channels (designated as A1, A2, A4, A5, A6, A7 and B7 channel types in the process group delineation in Draft F of the Tongass Land Management Plan revision) are source streams for downstream waters and transport organic and inorganic sediments to the downstream habitats. The stream channels are well contained within the narrow valley bottoms. Channel banks are steep and generally composed of large material, either consolidated bedrock or well packed boulders, rubble, and cobbles. The channels are predominantly influenced by the upland or terrestrial plant communities. Soils in the adjacent upland area are often shallow and subject to downslope movement. Leaves, forest litter, and trees often move downslope into these incised channels when disturbance occurs.

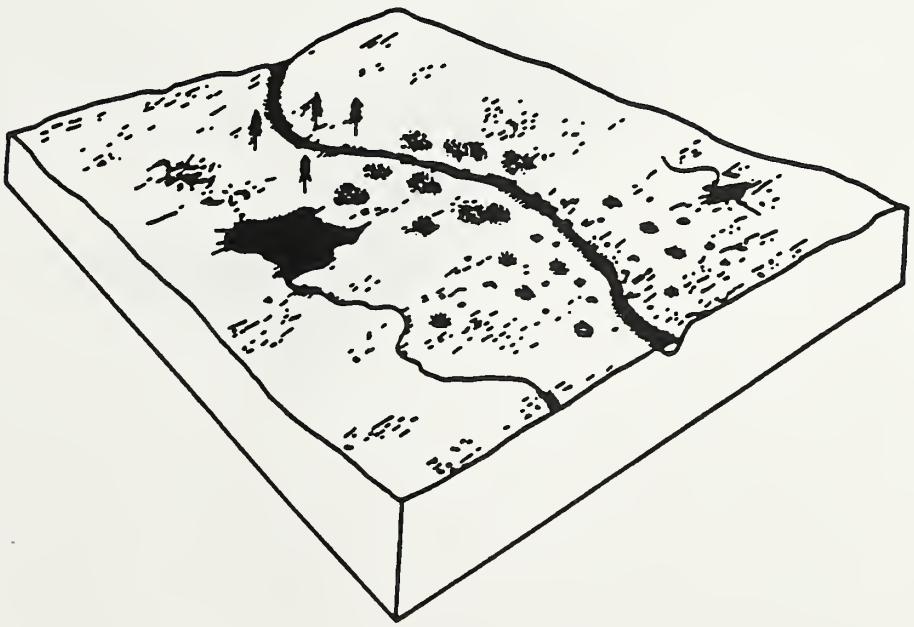
High gradient contained streams generally do not produce anadromous fish, as numerous waterfalls and cascades prevent access. The lack of high quality rearing pools limits the production of resident fish.



Glide Streams

These channels (designated as L1 and L2 in the process group delineation in Draft F of the Tongass Land Management Plan Revision) occur throughout the watershed on gently sloping lowland landforms and are frequently associated with bogs and marshes, or lakes. Because of the low gradient, most of the sediment being transported in the stream channels is sand-sized or smaller, and much of it settles out in the gently gradient channels. Though the channels are shallowly incised and have fair flow containment, flood flows usually overtop the streambanks and flow onto the adjacent landform, lessening downstream flooding and serving as a buffer during major storms. Low gradient, slow flowing streams are often associated with temperature sensitive watersheds. The lower banks are composed of material that erodes easily. Productivity of the channel is moderately tied to the riparian/terrestrial interaction. The bank trees control the channel stability in the floodplain control areas.

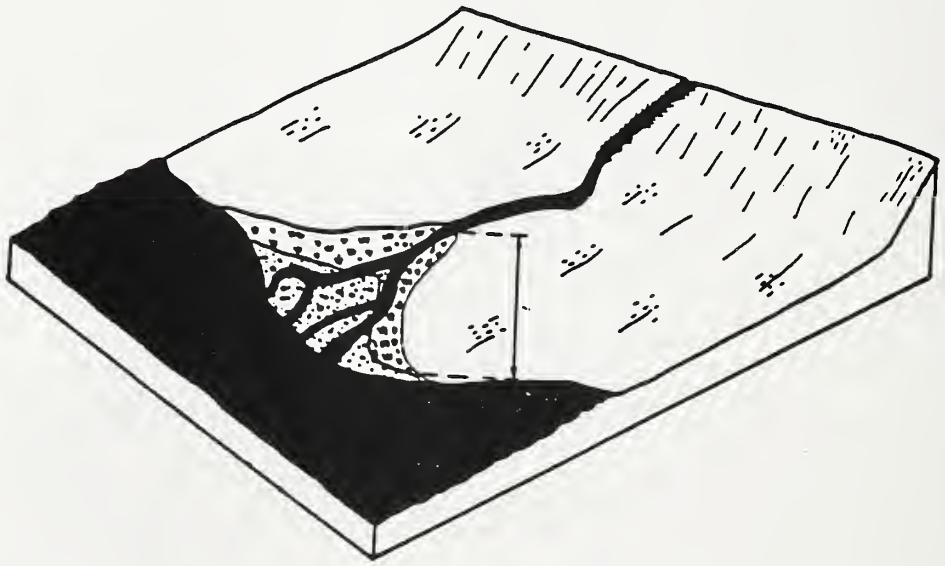
Glide streams have moderate to high capability for coho salmon. Spawning gravels are not abundant, but are usually sufficient to fully seed the available habitat. The channels provide summer coho rearing habitat, but usually more limited "overwinter" habitat, due to the lack of abundant large complex pools that provide quality winter refuge. C7 channels that form the outlet channels of lakes do provide good overwinter habitat due to the temperature moderation of the upstream lake waters. The better rearing habitat, particularly winter refuge habitat is tied to undercut banks and LOD controls the long term maintenance of much of the rearing and spawning habitat. The channels are frequently used by pink salmon for spawning.



Estuarine Stream Channels

These channels (designated as E1, E2, E3 and E5 channels in the process group delineation in Draft F of the Tongass Land Management Plan Revision) occur at the mouths of watersheds within estuarine landforms. The single to multiple channels are shallowly incised with fair to poor flow containment and are characterized by small alluvial material. The various channel types within the estuarine group are differentiated by channel substrate size. Sediments produced from the watershed are ultimately deposited in the estuarine channels. Consequently, they are highly sensitive to upstream management activities.

The streambanks and channel beds are composed of loose, fine-textured material which are easily eroded. As a result, bank widths and depths are highly variable and bank and channel beds are unstable. Sedge and marshland plants dominate the streamside and the interaction between the upland plants and the stream environment is minor. Stream migration and braiding varies, depending largely on bank and bed stability. The bed stability is critical for the production of pink salmon fry from the estuarine areas, where the streams are excellent producers of pink salmon. These channels provide important rearing habitat for most species.



Lakes and Ponds

These types (designated as L, L3, L4 and L5 channels in the process group delineation in Draft F of the Tongass Land Management Plan Revision) consist of lakes and ponds (including most beaver ponds). Lakes contain valuable aquatic habitat for some fish species, primarily sockeye and coho salmon, and trout.

Appendix B

APPENDIX B

SOIL HAZARD CLASSES

The planning level stability analysis of the study area is based on the Soil Resources Inventory of Kupreanof Island. Landscape hazard classes are used to group soil map units that have similar properties regarding the stability of natural slopes. Three classes; high, moderate, and low, rank soil units according to their relative potential for sliding. *Sliding* as used here is restricted to relatively shallow translational failures of the soil mass, and specifically excludes deep rotational failures and debris failures within stream channels. While slope gradient is the primary site factor determining the stability of natural slopes, soil and geologic properties, such as landform, soil and tree root cohesion, soil moisture regime, and the presence of a prominent slip-plane are used to determine relative stability of natural soil/landtype units. The relative ranking is based on the soil resource inventory, state-of-the-art research, and laboratory data on soil properties, as well as our collective experience in the management of similar soil/landtype areas on the Tongass National Forest.

HIGH

The soil/landtype units in this class are the least stable, and have the greatest probability of slope failure. These units generally have slope gradients that exceed the natural angle of stabilty. It includes most well-drained soils on slopes of 75 percent or greater, as well as some soils with restricted drainage (somewhat poorly and poorly drained soils) on slopes in excess of 65 percent. Most natural occurring landslides start in units of this class. These areas often, but not always, have visible indications of instability or past failures.

The risk of management-induced slope failures is so high on these areas that they generally preclud normal timber harvest and roading activities. Where management activities cannot be avoided on these areas, site specific investigations are necessary to determine on a case-by-case basis; (1) the probability of failure based on a site-specific stability analysis; and (2) the likely effect of a failure on associated resources such as water quality, fish habitat, etc. Forest roads can sometimes be built on these areas by locating them on included areas of lesser slopes such as a small bedrock bench, or by the application of unusual, and often prohibitively expensive, mitigative measures such as retaining walls, buttresses, bulkheads or other external support systems.

MODERATE

The soil/landtype units in this class are generally stable in an undisturbed condition, however, any natural disturbance or management practice that adversely changes the complex soil strength-stress relationship can result in slope failures. This class generally includes most well-drained soils on slopes ranging from 35 to 75 percent as well as some somewhat poorly-drained soils on slopes of 35 to 65 percent. These areas rarely have visible indications of instability.

Soil/landtypes in this class can be safely managed without a high risk of landslides by application of management practices designed to maintain the sheer strength of soil and roots, and avoid increasing the effective weight of the soil mass. Management practices should be designed to avoid interrupting the natural surface and subsurface drainage patterns and minimize disturbance to the soil surface.

LOW

Soil/landtype units in this class have the least probability of landslides. Any slope failures that do occur are usually associated with included areas of incised stream channels (V-notches), or short steep escarpments. This class includes soils with slope gradients less than 35 percent.

These areas are normally not subject to sliding; however, management practices designed to protect streambanks and V-notches and to prevent surface erosion are appropriate.

Appendix C

APPENDIX C

ROAD MANAGEMENT OBJECTIVES

Road Management Objectives

Nearly all proposed roads in the Analysis Area would be located upon lands with a Tongass Land Management Plan land use designation of IV. This land use designation allows opportunities for intensive resource use and development where emphasis is primarily on commodity or market resources.

The one exception is that approximately 1.0 mile of proposed Road 6030 in Alternative 5 would be located upon LUD II lands.

The existing north Kupreanof Island road system was developed primarily for timber resource management. Two independent transportation networks exist; one road network is interconnected with the village of Kake and thus tied in with the Alaska Marine Highway system, the other network is an isolated road system in and around the east side of Portage Bay.

Kake Network

The Kake roads will be managed for a full array of multiple use management: timber access, roaded recreation and forest administration.

Portage Network

Due to the lack of public access by the Alaska Marine Highway and the absence of developed communities, the Portage Road network will primarily be managed for timber resource management. Timber resource management includes but is not limited to logging, Forest Service administration and thinning activities. Fish and wildlife enhancement projects, and some recreation use areas will be accessible from the road system.

Road Management

All Forest development roads on north Kupreanof Island will have a long-term service life designation. These roads so identified will be developed and operated for long-term land management and resource utilization needs.

There are three functional levels of service applicable to long-term service roads: arterial, collector and local. Arterial roads serve large land areas and provide for maximum ability for travel efficiency. Collector roads serve to collect traffic from local roads and provide both multiple purpose needs as well as travel efficiency. Local roads serve a specific resource activity (logging, for instance) and usually have one principal purpose for being open or operated even though minor uses exist.

Long-term roads are also managed by their predicted cycle of entry. There are two standard cycles of entry - constant and intermittent. If the road is located in the network so as to have continuous or annual recurrent use, it is a constant service road. An intermittent service road is only needed for occasional use and is not used for periods that exceed one year.

Appendix D

APPENDIX D

TONGASS RESOURCE USE COOPERATIVE SURVEY MAPS AND LEGEND

Community abbreviation

- WR Community = Wrangell
- PE Community = Petersburg
- KA Community = Kake

Resource categories

- **EHD**- Ever Hunt Deer
- **MOD**- Most Often Hunted Deer
- **MRD**- Most Reliable Deer
- **PRD**- Previously Reliable Deer
- **SAL**- Salmon (Composite community data)
- **FIN**- Finfish other than salmon (Composite community data)
- **INV**- Marine Invertebrate (Composite community data)
- **MMM**- Marine Mammal (Composite community data)

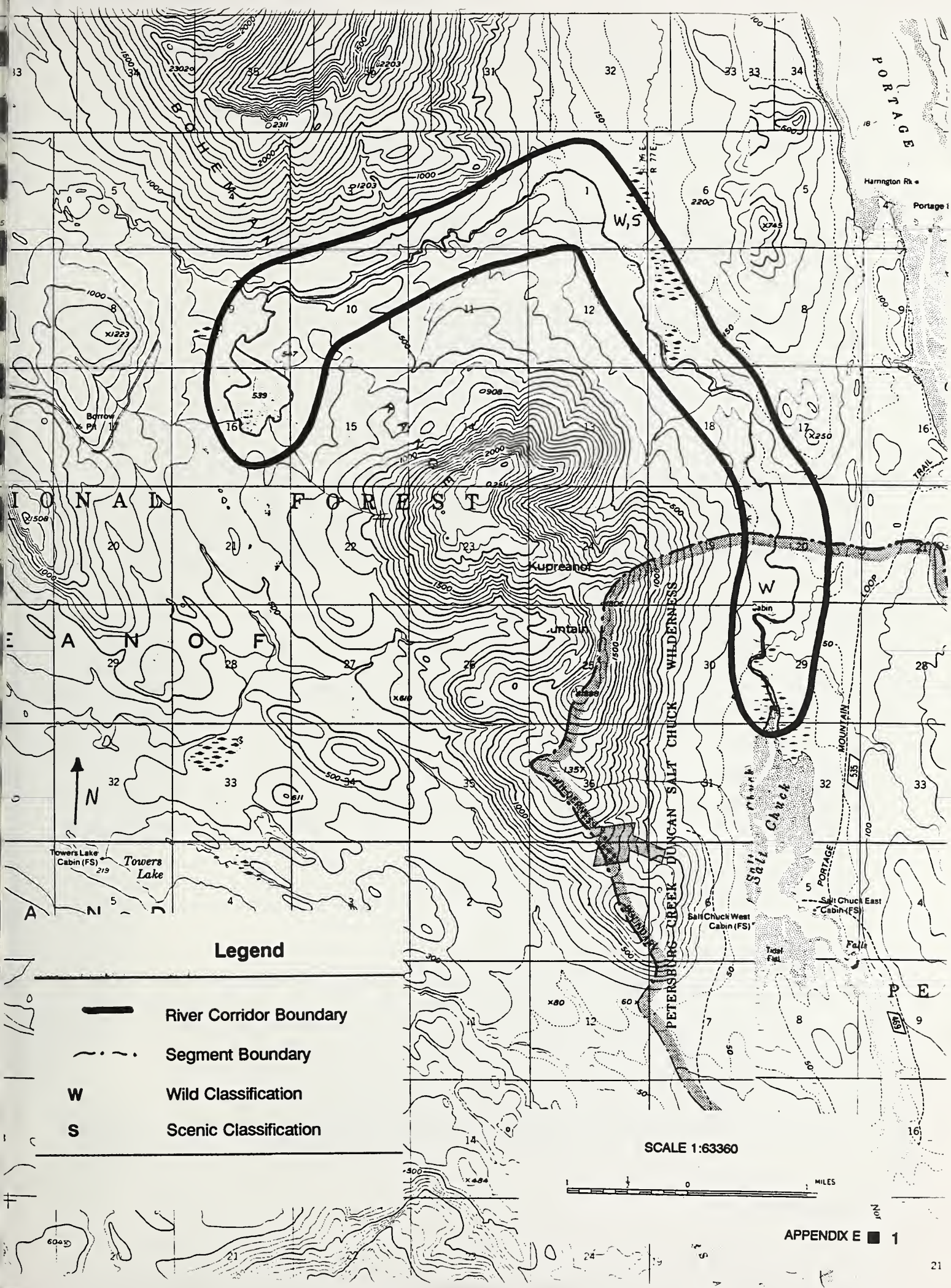
Map Legend

- **HH**- Household

Different categories based on use numbers are delineated on the maps included in this appendix. The categories of numbers range from 0-1, 1-3, 3-5, 5-10, 10-20, and 20+ households using the specified area.

It is important to remember the resource categories when referring to the maps. For example, EHD (Ever Hunted Deer) could show use patterns, but they actually could be quite old, ranging from 50 years old to the present, and sporadic in nature. The possibility exists that the households being surveyed are using different areas now.

Appendix E


W,S
W
Kupreanof
Mountain
Cabin
PETERSBURG CREEK-DUNCAN SALT CHUCK WILDERNESS
Salt Chuck Mountain
Salt Chuck
Salt Chuck West Cabin (FS)
Salt Chuck East Cabin (FS)
Towers Lake Cabin (FS)
Towers Lake
Portage
Harrington Rk
Portage L
Tidal Flat
Falls
TRAIL
LOOP
PORTAGE
N
SCALE 1:63360
MILES
Legend
River Corridor Boundary
Segment Boundary
W Wild Classification
S Scenic Classification

APPENDIX E

DUNCAN-SALT CHUCK CREEK SUITABILITY REPORT

Description

Located on the Petersburg Ranger District, Tongass National Forest, in the Central Interior Islands Geographic Province, Duncan-Salt Chuck Creek originates from elevations below 1000 feet at two small lakes and flows approximately 12 miles into saltwater at the outlet of the salt chuck in Duncan Canal on Kupreanof Island. The stream has high fish values for steelhead, silver salmon, chum salmon, and cutthroat trout. Duncan-Salt Chuck Creek also has high wildlife (waterfowl and black bears), scenic, and recreation values, centered around the salt chuck. There are two Forest Service recreation cabins near the mouth of the creek on the salt chuck. There is a proposal for road construction and timber harvest in the headwaters of Duncan-Salt Chuck Creek which includes an arterial road from Kake to Portage Bay. The segment west of the stream is already constructed. The lower 3.9 miles of the stream lie within the Petersburg Creek-Duncan Salt Chuck Wilderness Area. The river corridor contains 5705 acres and is entirely on National Forest Lands, with the exception of intertidal lands around the salt chuck owned by the State.

Eligibility

Duncan-Salt Chuck Creek has outstandingly remarkable fish, recreation, wildlife, and scenic values of regional significance due to the concentration of these values in a small area. The Alaska Department of Fish and Game lists this stream as one of 19 high value watersheds in southeast Alaska. There are two Forest Service recreation cabins located in Portage Bay. The Portage cabin averaged 105 Recreation Visitor Days (RVD's) from 1988 through 1990 and the Salt Chuck East cabin averaged 531 RVD's during the same time period. These are actual registered use numbers. Actual use may be as much as 20 percent higher. A significant amount of the cabin use is by people from out of state. The outstandingly remarkable visual resource is related primarily to views from the salt chuck, which include snowcapped peaks of the Portage Mountains outside the river corridor as a backdrop to the placid salt chuck water and the open grass flats. The rapids at the outlet of the salt chuck that flow both directions as the tide reverses are a characteristic feature of rivers in southeast Alaska, but would be considered uncommon in other parts of the United States.

Classification

Duncan-Salt Chuck Creek meets the guidelines for wild classification for 12 miles. For analysis, two river segments were condidered; Segment 1 from the falls at the outlet of the salt chuck upstream to the Wilderness boundary and Segment 2 from the Wilderness boundary upstream to Bohemia Lake.

Alternatives

A. Wild River designation for all 12 miles,

B. Wild River designation in Wilderness (3.9 miles) and Scenic River designation upstream from Wilderness boundary for 8.1 miles,

C. No designation as a component of the Wild and Scenic Rivers System, and

D. Wild River designation in Wilderness only

The alternative of recommending Segment 2 as a recreation river was not studied. There is no forseeable development that would render the river ineligible for consideration as a scenic river.

Suitability

Suitability Factor #1: Characteristics which do or do not make the area a worthy addition to the National System

Duncan-Salt Chuck Creek is typical of rivers in the rolling terrain of the Kupreanof lowlands. Its wildlife and fish values, scenic value associated with the views in and from the salt chuck, and recreation values associated with the salt chuck and lower river, considered in combination, are of regional significance. The river is one of 17 eligible rivers which potentially represent the Central Interior Islands geographic province. As a respresentative example of rivers on the Kupreanof lowlands, it is similar to Castle River and Petersburg Creek, and in that context would not be considered unique. It is one of three eligible rivers in the Central Interior Islands that includes an intertidal lagoon (salt chuck), a feature relatively common in southeast Alaska but not well represented in the National System.

Suitability Factor #2: Current status of land ownership and use in the area including the amount of private land and the uses of such land.

There are no private lands within the corridor. One valid existing mining claim west of the corridor would not be affected by designation. There is no private land and no effects on private land use. The State owns the intertidal lands within the salt chuck and is responsible for permitting use on such lands; there are currently no known plans for State authorization of land uses which would conflict with a wild river designation in Segment 1. A State plan was approved in 1984, for a Kake Coastal Management Program. This does not include any area within the tentatively eligible river corridor. (R. W. Pavitt and Associates, 1984).

Suitability Factor #3: Forseeable potential uses of the land and water that would be enhanced, foreclosed or curtailed by designation; and values which would be foreclosed or diminished if the area is not protected as part of the National System.

Transportation: Designation of Segment 1 as a wild river has no effect on present or future transportation system opportunities. Designation of Segment 2 as a wild river would foreclose the opportunity for future construction of a State Highway connecting Kake and Petersburg within the corridor identified by the State in 1973 and by the Forest Service as a vital transportation link without the approval of an EIS jointly by the lead Federal agency involved with approving the application and completing the analysis for a transportation corridor (ANILCA section 1100, 1980). Alternate routes, if available, would likely have higher construction costs, and could increase environmental impacts, particularly on soil and water, associated with road construction on steeper slopes and less suitable soil types outside the corridor. Designation of Segment 2 as a scenic river would allow for

the future construction of the State Highway on the planned location, with one road bridge across the river.

Water Resources: The area has no identified potential for water and power development and there are no existing powersite withdrawls. Designation as a wild river would be unlikely to affect the future availabilty of water supplies or electric power.

Mineral Resources: Segment 1 (Wilderness) is currently withdrawn from mineral entry. As a wild river, Segment 2 would be withdrawn from mineral entry; the absence of existing claims or known mineral resources indicate the withdrawl would likely have no significant effect on the availability of mineral resources. As a scenic river, Segment 2 would remain open to mineral entry.

Timber: Designation of Segment 1 as a wild river would have no effect on timber production because the area is currently in Wilderness. Designation of Segment 2 as a wild river would increase the cost of access to timber resources on the Bohemia Range north and west of the river corridor, and may foreclose access to timber on the west side of Portage Bay from the Hamilton Creek road. Access to timber resources from other locations east of the river corridor in Portage Bay would also require construction of additional roads and log transfer facilities at higher cost. Designation of Segment 2 as a wild river would eliminate potential harvest on approximately 947 acres of suitable forest lands within the river corridor, with potential volume of 1.57 mmbf. Designation of Segment 2 as a scenic river would allow restricted timber harvest on 947 acres of suitable forest land. Harvest activities will be limited and will utilize silvicultural treatments which will ensure compatibility with visual objectives for a scenic river designation. Intensity of harvest will be dependent on the landscape's ability to visually absorb the proposed activity.

Fisheries and Wildlife: Designation as a wild river would maintain existing habitat conditions and may serve as a corridor for movement of riparian and old growth dependent species. Development of potential fish habitat enhancements in Segment 2 would require appropriate access and design at potentially higher cost, or could preclude development. Designation of Segment 2 as a scenic river would allow typical fish habitat enhancement projects, increasing the potential for increased fish production. Stocking and fertilization of the small lakes in Segment 2, to enhance recreation opportunity, would be allowed in either designation.

Recreation and Subsistence: Designation as a wild river would maintain the current primitive/semi-primitive recreation opportunities. Access and competition for subsistence resources would remain unchanged. Most recreation and subsistence activity would continue to center around the salt chuck and lower reach of the river within the Wilderness. Designation of Segment 2 as a scenic river could increase access for some subsistence uses and enhance semi-primitive and roaded recreation opportunities if the road extension from Kake were to be constructed. Competition for subsistence resources could increase.

Scenic Resources: Because Segment 1 is within the Wilderness, designation as a wild river would not alter the current visual quality objective of Preservation, which allows only ecologic changes to the landscape. Designation of Segment 2 as a wild river would preserve the unmodified landscape within the river corridor.

Visual quality outside the corridor would be managed in accordance with adjacent Land Use Designations, and the visual quality objective for these adjacent lands would allow timber harvest and other activities that may dominate the landscape. Designation of Segment 2 as a scenic river would retain the visual character within the corridor as seen from the river, while areas outside the corridor would be subject to the visual quality objectives of adjacent Land Use Designations.

Effects of non-designation: Outstandingly remarkable scenic, recreation and wildlife values, concentrated in Wilderness in Segment 1, would not be adversely affected if the river were not designated as a wild river. Timber harvest on lands adjacent to the corridor in Segment 2 would likely be visible from the corridor; however, since scenic values were not considered outstandingly remarkable in this segment, this would not affect river values. Fish habitat values and sport fishing are adequately protected in Segment 2 by the application of the stream buffer requirement of the Tongass Timber Reform Act and the managment standards and guidelines. There is a potential in Forest Plan Revision alternatives C and D that timber would be harvested within the corridor in Segment 2 subject to stream buffer requirements and management standards and guidelines specified in the Stream and Lake Protection and Use Designation. Harvest in this segment would reduce the primitive character of the area and may increase access for recreation and subsistence uses.

Suitability Factor #4: Public, State and local governmental interests

The State maintains a strong interest in the opportunities for future development of transportation and other infrastructure to support orderly growth and viability of communities and may view a designation as unacceptable despite ANILCA allowance for location of transportation and utility corridors within conservation system units. The possibility of constructing a road which connects Kake and Petersburg (identified in the Southeast Alaska Corridor Plan) has been the subject of local controversy, with some residents in and near these communities opposed to a road link and others in favor. This issue was a factor in determining the present boundary of the Petersburg Creek-Duncan Salt Chuck Wilderness so that the possible road corridor area was excluded from the Wilderness. While not directly related to the suitability of the river, this ongoing public debate creates an atmosphere in which a proposal by the Forest Service to either extend the road on this alignment connecting Kake and Portage Bay, or designate Segment 2 as a wild river, possibly affecting the road opportunity, could be viewed as Federal interference in a local and State government issue. No public comment on the Revision Draft Environmental Impact Statement specifically referring to Duncan-Salt Chuck Creek has been received, although one national environmental organization has indicated an interest in the potential for designation.

Suitability Factor #5: Estimated cost of land acquisition and managment as a wild and scenic river

There would be no acquisition of private lands, no recreation or other developments are proposed for the area, and planning and management costs are relatively low because the portion of the river with significant public uses is within the Wilderness. The following are the expected *additional* funding needs for a five year period if the river were designated:

General Administration	not estimated
Cost of Implementation	$ 5,000 total
Management Plan Development	$ 20,000 total
Development Costs	$ 0 total
Operation and Maintenance	$ 2,500 annual
Total- First Five Years	$ 37,500

Suitability Factor #6: Other issues and concerns